THE CYPRUS AGRICULTURAL JOURNAL

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The
Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

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EDITORIAL NOTES.

It is gratifying to record that there has been a decided improvement in the agricultural prospects during the last three months. Adequate rains have fallen in all districts and farmers have had every opportunity to irrigate thoroughly their fields from the rivers and streams. Temperatures on the whole have been low thus causing slow growth of crops and natural grazing, but heavy falls of snow have occurred in the mountains and the prospects of wells and springs returning to normal have improved and it is anticipated that there will be adequate irrigation water supplies for summer crops.

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Seed Corn Loans.

The issues of seed wheat and barley as a relief measure to villages short of seed corn through the effects of the two years drought have been completed and the following is a summary of the measures taken by Government to assist the needy farmers.

The total amount of funds advanced by the Loan Commissioners to the Director of Agriculture for the purchase of seed corn was £5,250. Besides the seed corn purchased with the above advance some 4,244 kilés of wheat and 1,462 kilés of barley were returned to store in kind by certain villages in repayment of the previous year's loan. The total amount of seed wheat and barley available for issue was 25,718 kilés of wheat and 12,393 kilés of barley and these amounts were issued on loan to farmers in each District as follows :—

District.	*Wheat. Kilés.*	*Barley. Kilés.*
Nicosia and Kyrenia	14,087	7,461
Famagusta	6,378	2,703
Larnaca	1,214	504
Limassol	2,415	1,497
Paphos	1,624	228
Total	25,718	12,393

FIRST CONSIGNMENT OF CYPRUS GRAPEFRUIT.

The first shipment of grapefruit to be consigned from Cyprus to London was received in Covent Garden on 9th February. It consisted of 8 cases of fruit from a private plantation at Potamia, the trees of which were supplied by the Department being the progeny of trees originally imported in 1928 from South Africa.

The fruit was described as being "well packed though somewhat pithy" but it was sold at retail prices comparing favourably with those of fruit from Palestine, British West Indies and Florida—countries famous for their grapefruit.

The "pithiness" referred to is explained by the fact that the fruit was taken from very young trees. It is well known that the quality of grapefruit improves as the trees become older.

When this is taken into consideration, the prices obtained for this first trial consignment of Cyprus grapefruit are definitely encouraging.

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Trikoukkia Nursery Garden in Winter.

TRIKOUKKIA NURSERY GARDEN.

The above photograph shows a section of the Trikoukkia Nursery Garden in winter. The apple stock are part of the consignment received from East Malling, Kent, and the production of apple stocks by vegetative methods, which are carried out there, was described in the note "Vegetative Propagation of Deciduous Fruit Trees by Stock Layers," published in this Journal, Vol. XXVIII, Part 2, of June, 1933.

BITTER ORANGES.

Continued reports from the Trade Commissioner for Cyprus in London make it clear that there is a good demand for Cyprus bitter oranges on the United Kingdom markets.

One marmalade firm alone, it is stated, would take almost the entire present Cyprus crop for the production of " Empire " marmalade, and there is also a good local demand.

Cyprus is one of very few Empire countries producing bitter oranges and it enjoys the 10% Empire preference. When planting up new areas, growers would do well to consider putting down a small block of bitter oranges in one corner of their plantation. Either seedling bitter oranges or selected types worked on bitter orange stocks should be planted.

The cost of collection for packing if bitter oranges were grown in blocks would be much less than at present when a few trees are scattered at random over a large area, rendering collection difficult and costly.

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FIRE AT THE AGRICULTURAL DEPARTMENT'S HEADQUARTERS.

A serious fire occurred at the Headquarters of the Department of Agriculture in the early hours of the morning of the 13th December, 1933. Most of the records of the Department and the whole library were destroyed. The staff have been temporarily accommodated in the Lecture Hall and various small buildings near the main building, which was destroyed, pending reconstruction of a new office on the old site.

Although seriously handicapped, immediate steps were taken to keep the various services of the Department functioning normally and to deal with all outstanding or pending matters. In the event of any readers finding that some correspondence or enquiry has not been dealt with, they are requested to notify the Director of Agriculture with a copy of the original enquiry or relative correspondence.

The loss of records will prove a serious handicap to the Department for some time to come and much work already completed will have to be done again.

The cause of the outbreak is unknown.

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REORGANIZATION OF THE DISTRICT STAFF.

As from 1st February, 1934, a reorganization of the district staff has been brought into effect. A notice is published in the advertisement section in this issue giving further details of this reorganization. Each district has been sub-divided into small areas with an agricultural officer in charge, who is responsible to the Senior Officer in charge of the whole district,

The areas have been arranged for convenience of travelling so as to permit the agricultural officer to get to know the whole of his district intimately and to be able readily to advise and instruct the farmers therein in agricultural matters. A number of new stations have been opened and it is hoped through this itinerant agricultural instruction to bring the farmer into closer touch with the Department and its activities and thus assist in the promotion of agricultural prosperity.

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CYPRUS TOBACCO STOCKS.

According to the Port of London Authority Official Dock Report for the 31st December, 1933, the total quantity of Cyprus tobacco stored in their bonded warehouses at that date was 866,000 ℔.

It is estimated that this stock is composed approximately of the following two types produced in Cyprus :—

Latakia Fumigated Pipe Tobacco.. 2,400 bales=550,000 ℔.
Yellow Cigarette Leaf .. .. 3,700 bales=316,000 ℔.

During the year 1933 the total deliveries from bond, being the quantity of Cyprus tobacco that can be regarded as withdrawn for use by manufacturers during that year, amounted to about 300,000 ℔. estimated approximately as follows :—

Latakia Fumigated Tobacco, say 600 bales=140,000 ℔.
Yellow Cigarette Leaf, say 2,000 bales=160,000 ℔.

Therefore, according to this basis of last year's usings, it can be calculated that the Latakia stock of tobacco now in London Bond is sufficient for 4 years and the Yellow Leaf for 2 years.

It should be borne in mind, however, that the more important British manufacturers usually hold 2 to 3 years' stock of the tobaccos used in their Brands, and buy their requirements annually to keep their stocks up to this provision.

The stocks of Cyprus tobaccos, mostly 1933 crop, remaining for market in Cyprus at the end of 1933 are approximately as follows :—

Latakia Fumigated Tobacco about 30,000 okes=85,000 ℔.
Yellow Cigarette Leaf about .. 25,000 okes=70,000 ℔.

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TRIALS WITH HERBAGE SPECIES.

(1) TRIALS AT CENTRAL EXPERIMENT FARM, MORPHOU.

As a preliminary step in the investigation of the fodder crop problem in Cyprus, a series of observation plots with herbage species have been laid down at the Central Experiment Farm, Morphou.

Seed of drought-resistant grasses and clovers which have been successful in countries with climatic conditions similar to those of Cyprus has been obtained from Australia, Kenya and South Africa, and these have been placed under trial together with some of the more promising of our local wild species. All the plots are being grown without irrigation.

The advice of the Imperial Bureau of Plant Genetics (Herbage Plants), Aberystwyth and of the Waite Institute of Australia has been followed in selecting the majority of the imported species among which are: *Melilotus parviflora*, *Trigonella fœnumgræcum*, *Eragrostis abyssinica*, *Atriplex semibaccatum*, *Themedatriandra*, *Panicum maximum*, *Cynodon dactylon* (2 strains), *Cynodon plectostachyum* (2 strains), *Panicum coloratum*, *Pennisetum ciliare*, *Phalaris tuberosa*, *Wimmera Rye Grass* (*Lollium sps.*), *Paspalum dilatatum*, *Trifoleum subterraneum*, *Chloris gayana* and *digitaria sps.*

If the observation plots show any of these species to be a success under Cyprus conditions, such species will be selected for further trial and seed will, in the course of time, be available for issue to the more progressive farmers.

Quantities of seed of the above named species are also being grown at Morphou for acclimatization purposes.

(2) TRIALS AT NICOSIA.

In conjunction with the above, a trial has been laid down at Nicosia with a seeds mixture made up of :—

Trifolium subterraneum	.. 3 parts.	*Phalaris tuberosa*	.. 1 part.
Wimmera Rye grass	.. 1 part.	*Chloris gayana*	.. 1 part.

This was sown at the rate of about 8 lb. to the donum, half the seeds mixture being sown by itself and half under barley.

Report on Liquorice Root from Cyprus.

BY THE IMPERIAL INSTITUTE.

THE sample of liquorice root, which is the subject of this report, was forwarded to the Imperial Institute by the Director of Agriculture, and is referred to in his letter No. Agr. 429/1933 dated 16th October, 1933.

It was stated that a quantity of 3 or 4 tons of the material was available in Cyprus and that further quantities up to 10 or 12 tons could be secured, and it was desired to learn the market value of the product and the prospects of sale.

DESCRIPTION.

The sample consisted of unpeeled liquorice roots, which were on the whole rather thin and measured from 4 to 6 inches long by 0.2 to 0.6 inches in diameter. Externally they were covered with dark brown bark, longitudinally wrinkled. Internally the roots were yellow to yellowish-brown. The fracture was fibrous. Some of the pieces were hard and woody.

RESULTS OF EXAMINATION.

The material was examined with the following results, which are shown in comparison with the requirements of the British Pharmacopœia for liquorice root:—

	Present Sample. per cent.		*British Pharmacopœia requirements. per cent.*
Moisture in roots as received ..	12.5	..	—
Matter soluble in chloroform water, expressed on the air-dried roots (*i.e.*, as received)	25.7	..	not less than 20.0
Ash, expressed on the roots dried at 100° C. (*i.e.*, moisture free)	4.6	...	not more than 10.0
Acid-insoluble ash, expressed on the roots dried at 100° C. (*i.e.*, moisture-free) ..	0.3	..	not more than 2.5

From these results it will be seen that the present material complies with the requirements of the British Pharmacopœia.

COMMERCIAL VALUE.

(1) The roots were submitted to a firm of importers in London, who stated that as liquorice root is imported from the Mediterranean region there appears to be no reason why the Cyprus product should not be acceptable on the market. They added that they had forwarded the sample to one of their customers from whom they had received the following report:—

> "The quality of the sample appeared to us quite good, but we are sorry we cannot hold out hope of any business with you in this article for the time being, as we have rather large stocks."

(2) The material was also forwarded to brokers, who described it as clean, but a little dull, and not so bright in fracture as the best kinds. They stated that liquorice root from various countries is at present realizing about £13 to £18 per ton ex-warehouse London, duty paid, according to quality, and estimated that the present product from Cyprus would be worth about £15 per ton. They pointed out that it would have the advantage of coming in free of duty if a proper certificate of origin were furnished with each shipment.

REMARKS.

The sample of liquorice root represents a product which should be saleable in London in competition with supplies of good quality from other sources. In order to test the market a trial consignment of 1 ton of the material now available in Cyprus might be forwarded to London, together with a certificate of origin, when the Imperial Institute will be glad to assist in its disposal.

Report on Sunflower Seed from Cyprus.

BY THE IMPERIAL INSTITUTE.

THE sample, which is the subject of this report, was forwarded to the Imperial Institute by the Director of Agriculture and is referred to in his letter No. Agr. 341/1933 of the 14th September, 1933.

The seed was stated to represent the 1933 crop and was submitted with a view to ascertaining the possibilities of producing sunflower seed oil in Cyprus.

DESCRIPTION.

The sample weighed 5½ lb. and consisted of a mixture of black and striped (grey and white) sunflower seeds of normal appearance. The seeds were rather of variable size, ranging from 0.4 to 0.6 inches (mostly 0.5 inches) in length and from 0.2 to 0.35 inches (mostly 0.25 inches) in breadth. They were on the whole fairly plump, the black ones being plumper than the striped seeds. The sample was practically free from dirt but contained a small amount of vegetable debris. The average weight of 100 seeds was 7.9 grams, showing the seeds to be of normal weight on the average.

RESULTS OF EXAMINATION.

The sample was found to contain 8.1 per cent. of moisture and to yield on extraction with light petroleum 24.2 per cent. of oil, equivalent to a yield of 26.3 per cent. from the moisture-free seed.

The oil was pale golden-yellow, and on standing became slightly turbid owing to the separation of a small amount of stearin. It was examined with the following results, which are shown in comparison with the range of corresponding figures recorded for commercial sunflower seed oil :—

	Present Oil.	*Commercial Oil.*
Specific Gravity at 15/15° C. ..	0.9216	0.924–0.926
Refractive Index at 40° C. ..	1.4655	1.4659–1.4682
Acid Value	2.8	1.0–10.0
Saponification Value	192.2	190–194
Iodine Value (Wijs, 3 hrs.) per cent.	115.8	125–140
Unsaponifiable Matter, per cent.	1.0	0.3–0.9

The residual meal left after the extraction of the oil from the seeds with light petroleum was pale greyish-mauve and practically devoid of taste. It was analysed with the following results, which are shown in comparison with the figures recorded for undecorticated sunflower seed cake :—

	Present meal.	*Undecorticated sunflower seed cake.*
	per cent.	*per cent.*
Moisture	10.0	7.10
Crude Protein	21.2	19.01
Oil	0.3	7.43
Carbohydrates, etc., (by difference)	24.9	28.93
Crude Fibre	39.2	30.03
Ash	4.4	7.50
Nutrient Ratio	1 : 1.2	1 : 2.4
Food Units	79	95

By calculation from the above figures the original seeds from Cyprus had the following composition :—

	Per cent.
Moisture	8.1
Crude Protein	16.0
Oil	24.2
Carbohydrates, etc., (by difference)	18.8
Crude Fibre	29.6
Ash	3.3
Nutrient Ratio	1 : 4.7
Food Units	119

The results of examination show that the present seeds contained a normal percentage of oil, the usual range being from 22 to 28 per cent. The oil has an iodine value rather lower than that usually recorded for sunflower seed oil. The composition of the residual meal is normal.

REMARKS.

The results of the examination of this sample of sunflower seed show that it contains a normal percentage of oil which is of satisfactory quality. Such seed should, therefore, be quite suitable for the preparation of the oil in Cyprus.

Consignments of sunflower seed oil should be saleable in the United Kingdom at £18 to £19 per ton under present market conditions.

Diseases of Cereals.

BY R. M. NATTRASS, *Government Mycologist.*

II. THE FLAG OR LEAF SMUT OF WHEAT.

THE Flag or Leaf Smut is a serious disease of wheat to which attention has already been called in a previous issue of this Journal (March, 1932). Since then a survey of the distribution of the disease in the Island has been attempted. It appears that the disease is widely distributed and occurs in all wheat growing districts of the Island. None of the native varieties of wheat appears to be resistant to the disease but search for resistant strains is being continued. Meanwhile, two varieties from Australia, Nabawa and Geeralying are being propagated at the Central Experimental Farm at Morphou. It is hoped that seed of these varieties will eventually be available for distribution. In view of the serious nature and wide distribution of Flag Smut it is considered that a more detailed account is desirable to enable farmers and others readily to recognize the disease in the field.

Flag Smut of wheat, which is caused by a microscopic fungus known as *Urocystis tritici*, was first recorded in Australia in 1868, though it was probably established there before that time. It is widely distributed in other parts of the world. It was reported from Japan in 1895, from India in 1906 and from South Africa in 1920. It is well established in Southern Europe and is known to occur in China. It was not found in the United States till 1920. In Cyprus it was not definitely recorded till 1931 but has probably existed here for a number of years without being recognized.

Flag Smut is considered to be one of the most destructive diseases of wheat and losses caused by this fungus are greater than is generally realized, chiefly because it does not attract attention as do other fungus diseases such as head smuts and rusts. Diseased plants are readily overlooked in the field. They occur during the early stages of growth of the crop and, to the untrained observer, are not very easy to detect. By the time the crop comes into ear, the diseased plants are withered and generally escape notice. Hence the loss may be overlooked at harvest time and possibly attributed to other causes. Where wheat is grown year after year the loss is continuous and insidious. Whereas epidemics of rust occur at certain intervals, which are usually few and far between, the loss from Flag Smut occurs year after year. In Australia it is estimated that the loss in any individual field may be from 5–70% of the crop. In Cyprus the disease is undoubtedly of a much more serious nature than is generally recognized. Farmers and others connected with cereal growing should become familiar with the symptoms of the disease in the field. Any officer of the

Department of Agriculture will be glad to inspect the field of any farmer and point out the disease if present. Specimens of the disease can also be seen at the Headquarters of the Department and at any district office.

FIG. 1.—Young wheat plants attacked by Flag Smut, showing the black stripes caused by the disease (*From Bulletin 242, University of Illinois, Agricultural Experimental Station.*)

Flag or Leaf Smut of wheat, as the name implies, attacks only the leaf blades and sheaths and is quite distinct from the well-known head smuts which are only visible when the crop comes into ear. The first symptoms of the disease are more or less elongated grey or dull white stripes on the young leaf.

Though in the early stages the stripes are somewhat lighter than the normal green colour of the leaf they soon become lead coloured and finally black. The stripes, which may be from a few millimetres to several centimetres in length, are slightly raised and are usually first apparent on the under side of the leaf blade, between the ribs. Infected plants are usually more or less dwarfed; the leaves and sheaths often become twisted and the plant may become considerably deformed. As a rule every tiller of an infected plant shows the symptoms of the disease. Diseased plants rarely produce any heads and, if formed, are usually empty or contain only shrivelled grains. More usually the plants are destroyed before the healthy ones have reached maturity, so that there is little or no indication at harvest time of the loss which has been incurred.

The parasitic fungus causing the Flag Smut of wheat belongs to the same group as those which produce the common head smuts, such as the Covered and Loose Smuts of Barley and Oats and the Loose Smut of Wheat, all of which are of common occurrence in Cyprus. It is more closely related to the Smut of Onions, which happily has not been seen in Cyprus, and to the Leaf Smut of Rye.

As the fungus in the plant develops, the longitudinal stripes turn black, as the fungus beneath the skin produces a multitude of dark coloured spores. These in mass appear black and so produce the black colour of the stripes. The spores are markedly different from those of the head smuts which are minute and consist of a single cell only. The spores of Flag Smut are considerably larger, yet only about one-thousandth of an inch in diameter. They consist of from one to five large cells enclosed by a layer of small sterile cells. The whole structure is usually known as a "spore ball."

Under suitable conditions germination of the spores takes place by the production of small tubes or threads arising from the large inner cells. One, two or all of these cells may germinate. These tubes or threads do not infect a wheat plant direct but produce two or more secondary spores. These in turn germinate and produce a fine thread (germ-tube) which can penetrate the delicate tissue of the young wheat plant. Here the fungus ramifies through the tissue, absorbing nourishment so that the victim becomes stunted and finally killed. Before this stage is reached the fungus has once more produced an abundance of spore balls in the tissue between the ribs, giving rise to the characteristic dark coloured stripes. As these ripen the skin (epidermis) along the stripes is ruptured, setting free the spore balls which can thus contaminate the soil, to infect succeeding wheat crops.

The spores of Flag Smut may be brought into contact with healthy wheat grain in two ways. The diseased plants of the previous crop remain on the land and gradually become broken up,

FIG. 2.—Portion of wheat leaf, greatly enlarged, showing the longitudinal black stripes, some of which have burst liberating the spores (*From Bulletin 242, University of Illinois, Agriculture Experimental Station.*

further contaminating the soil. During threshing, diseased straw harvested with the healthy straw may get broken up in the threshing machine or on the threshing-floor and so adhere to

healthy grains in the same way as the spores of Bunt and other head smuts. In this way seed from a healthy field may pass through a contaminated machine and also become contaminated. The disinfection of threshing machines may, therefore, be considered an important factor in reducing the spread of infection, not only of this but of all diseases which are disseminated by spores attached to the seed. The spores may also be blown about by the wind, carried on the feet of men and animals or, by contaminated grain and straw being fed to stock, find their way back to the land in the manure. The crop is, therefore, liable to infection from two sources. The land which previously bore a diseased crop is already contaminated with spores or the seed itself may have become contaminated during harvesting or threshing.

Spores adhering to the grain can be destroyed by the treatment of the grain with various fungicides. Chemical dusts have been shown to be effective in controlling the disease in South Africa. Farmers are strongly advised to treat their seed wheat with copper carbonate or "Agrosan" as a matter of routine as, by so doing, both the Flag Smut and the Bunt will be controlled. The method of treating seed corn with dusts has been described in the first of these series in the article on the Bunt or Covered Smut of Wheat (this Journal, Vol XXVIII, Part 3, September, 1933). Experiments have shown that very heavily contaminated seed is not effectively controlled by copper carbonate dust but such a condition is not likely to arise in practice. Heavily contaminated seed can be treated by the wet methods such as the copper sulphate and formalin treatments. It is, however, very much better to obtain clean seed from a healthy crop than to attempt treatment of heavily contaminated seed.

To eradicate the disease, once it has become established in the soil, is much more difficult and for this reason care should be taken not to introduce the disease by sowing seed from an infected crop.

The spores retain their vitality in the soil over long periods, probably as long as four to five years, so that as long an interval as possible should be left between two wheat crops. As the fungus is not known to attack any other plant it is possible by suitable rotations to free the land from spores capable of reproducing the disease. A one-year interval is not sufficient; if wheat and barley are sown in alternate years the spores can easily survive from one wheat crop to the other.

The introduction of certain varieties of wheat, which are resistant to the disease yet at the same time suitable to Cyprus conditions, is the most promising means of control. It is hoped that in time resistant strains of local wheat will be forthcoming. Meanwhile, the Australian wheats previously mentioned are the only ones so far available in Cyprus.

Pruning Young Fruit Trees.

BY B. J. WESTON, *Government Horticulturist.*

PRUNING has been defined as "the art of modifying the natural habit of the fruit tree in order to secure fruit in greater abundance, more regularly and of better quality than would otherwise be the case." In adult trees this necessarily varies a good deal according to the bearing habits of the tree. For instance apples and pears bear the major portion of their fruit terminally on spurs which may remain productive for from 8 to 10 years, whilst peaches bear laterally on long shoots of the previous years development. The pruning of young trees, however, is in general the same for most types of fruit, and the chief objects to be kept in mind are, broadly speaking, three: to produce a vigorous, mechanically strong, healthy tree; to produce a well-shaped tree for convenience and economy in cultural operations, spraying, picking, etc.; to distribute the fruiting area well over the tree.

PRUNING YOUNG DECIDUOUS FRUIT TREES.

When a young deciduous fruit tree is transplanted from the nursery to the orchard, many of its roots are lost in the operation of lifting and the remaining roots are not sufficient to support the same portion of the tree above ground. There is a very definite relationship between the portion of the tree below ground and the portion above ground and it follows that if a portion of the root system is removed, an approximately equivalent portion of the top should be cut away at the same time, viz., at the time of lifting from the nursery.

The height at which the young tree should be headed varies with the individual preference. In Cyprus the tendency has usually been to head trees very high in order to facilitate cultural operations by animal, and the cultivation of garden crops beneath the trees. Low heading, however, does not cause the main limbs to develop in such a way as to impede cultural operations. The main branches arise from the trunk at a sharper angle than from a high headed tree; low headed (20–30 inches) trees are easier to handle as regards pruning, spraying and picking the fruit, also a low headed tree is less liable to become affected by sun-burn owing to the shading given to the trunk by the branches in the early years of growth; further, wind injury—a serious factor in Cyprus—will be less serious with low than with high headed trees.

One of the most important steps in the pruning of the young tree is the formation of the "scaffold" * branches. From 3 to 5 scaffold branches should be chosen and these should be well placed both round, and up and down the trunk (diagram 1). A vertical distance of about 6 inches is stated

* A "scaffold" branch is one which forms part of the main framework of the tree.

to be ideal spacing. Two branches coming off at the same point should not be chosen owing to the danger of splitting when the tree is carrying a heavy crop of fruit.

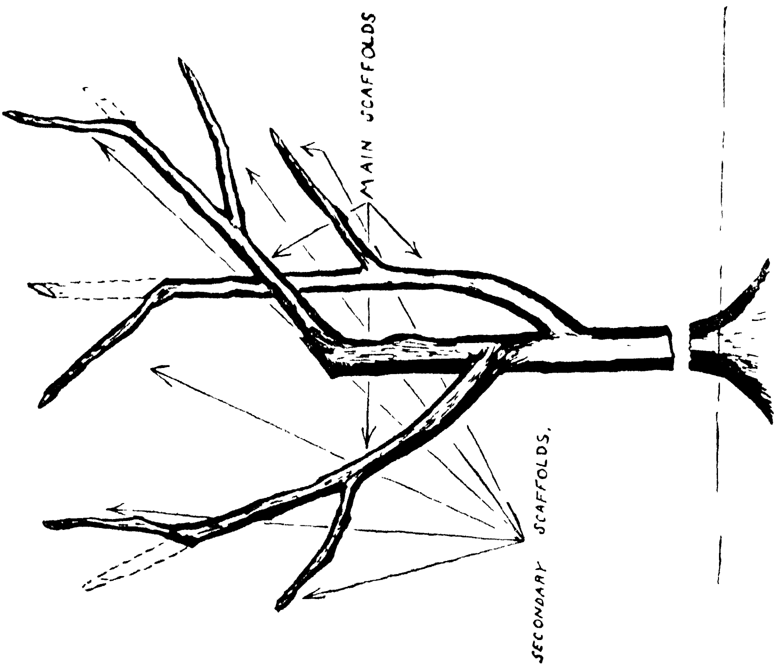

Diagram 2.

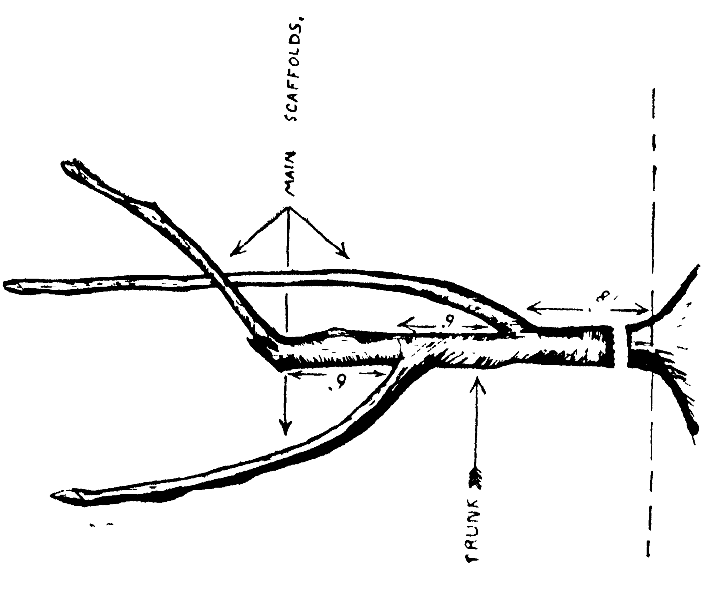

Diagram 1.

After planting, the young tree should be protected from sun-burn in summer by a covering of newspaper, dried grass or whitewash round its trunk. Sun-burning is especially prevalent in Cyprus owing to the exceptionally severe summer heat and it is, therefore, very important to guard against it.

Some types of fruit trees have a tendency to form side branches in the nursery, notably almonds, apricots and kaishas, and Japanese plums. (The latter fruit is now beginning to become known in Cyprus.) If these side branches are properly spaced by judicious management in the nursery after budding or grafting they can be used in the formation of the head when the young tree is eventually planted out in the orchard.

Apples, cherries, pears and European plums, on the other hand, have a tendency to form a single whip-like growth in the nursery and assuming these are planted after one year's growth from bud, as is frequently the case in Cyprus, all the pruning required at the time of planting is to cut the tree back to the height at which it is desired to form the head (20 to 30 inches).

Heavy pruning of young trees is now thought to be inadvisable and the lighter the pruning (although always in relation to the amount the roots have been cut in lifting) and consistent with the eventual shading of the tree, the better.

With the " whip " type of trees (apples, pears, etc.) in the spring following planting many lateral shoots appear, and usually more than are required. Those selected for " scaffolds " should be well spaced, as stated above, and should also be arranged, if possible, so as to give a certain amount of shade to the young tree. The superfluous shoots should not be removed entirely but should be pinched back so as to leave a rosette of leaves at the base, to help in protection from sun-burn and in the manufacture of carbohydrates for the development of the young tree. The " scaffolds " should normally remain untouched during the first growing season, but if one is found to be going too far ahead of the others in growth, it should be lightly tipped, to allow the other " scaffolds " to catch up and keep the tree symmetrical.

The types of fruit trees which form heads in the nursery are pruned somewhat differently from the " whip " types at first as the " scaffolds " can be selected when planting. The tree should be headed back about 36 inches from the ground which will make the head come about 18 inches from the ground (as measured from the ground to the lowest " scaffold.") The trunk and " scaffolds " should be protected from sun-burn during the summer following the initial pruning.

At the first dormant pruning of the "whip" type trees, 3 to 5 "scaffolds" should be already developed and there will probably be a good deal of twig growth between them (developed as a result of the spring pinching). All these twigs should now be entirely removed as also should any "waterspouts" arising from the bud union or below it. A very light cutting back of the "scaffolds" is recommended at this stage, as if "scaffolds" which have made good growth remain unpruned, the secondary branches may arise too far out from the trunk. They should, therefore, be headed back to from 18 to 20 inches if they have made greater growth than this. Should the "scaffolds" have made less than 21 inches growth they should be left unpruned, because cutting back this short growth would result in overcrowding of the "secondary scaffolds."

At the first dormant pruning of the branched type of tree, the "scaffolds" will have already been formed and a good deal of secondary growth will have arisen as well. On each "scaffold," two "secondary scaffolds" should be chosen so that one will be at the end of the main "scaffold" (diagram 2). All other secondary shoots should be removed. The "secondary scaffolds" should be on opposite sides of the main "scaffold" and should not be too close together. As described in connection with the formation of the main "scaffolds," should any of the "secondary scaffolds" develop much quicker than the others, they should be pinched back to keep the tree as symmetrical as possible.

At the second dormant pruning of the "whip" type, the "secondary scaffolds" are chosen as in the manner outlined for the "branched type" trees at the first dormant pruning.

At subsequent (3rd and 4th) dormant prunings of both types of young trees, they should be thinned out and *if growing vigorously*, some of the shoots may be shortened or cut back to laterals.

Peaches, almonds, Japanese plums and apricots should carry a commercial crop in the fourth or fifth year after planting. Apples, pears, cherries and European plums from five to eight years after planting, assuming budded or grafted trees at least one year from working are planted.

Numerous pruning experiments carried out in England, U.S.A. and South Africa have shown that light pruning such as has been outlined above results in rather earlier bearing than if the young tree was heavily pruned. Other things being equal, light pruning also results in rather heavier bearing.

PRUNING YOUNG CITRUS TREES.

Evergreen trees normally require a minimum of pruning, and this is especially true of citrus fruit trees.

When the young tree is planted out in the grove, it may or may not have a head already formed. Should it not have a head already formed, the small whip-like tree should be cut back to from 26 to 30 inches; it should be protected from sun-burn in the manner described for young deciduous trees; and when the new growths are about six inches in length 3 to 5 " scaffolds " should be chosen also in the manner described for deciduous fruit trees. In Cyprus the tendency is to allow " scaffolds " to arise too close together which later results in overcrowding; in the formation of a " pocket " in which water collects and weakens the tree from point of view of disease resistance; or in splitting when the tree is carrying a heavy crop of fruit. Thus the proper selection of " scaffolds " is of great importance and if well done should obviate the necessity of propping the tree in its later years.

The correct height at which the head of citrus trees should be formed is probably in the neighbourhood of 30 to 36 inches, as if the head be formed too low it may later result in damage both to the tree (during cultural operations) and to the fruit (through brushing against the soil).

After selection of the main framework of the tree, the only other pruning necessary is to thin out superfluous branches, crossing branches, and branches arising at the same point. This thinning out should be done about every three months for the first year after planting to avoid wasted effort on the part of the tree, and thereafter about twice a year.

Careful training of the young tree is important and will result in the formation of a mechanically strong and well formed tree. All " die-back " should be removed as this may give rise to infection from disease.

Citrus trees (especially grapefruit) frequently bear a few fruits during the second year in the grove. These should be removed in order to allow the young tree to utilize all available plant foods for the development of its framework and not to waste its energy in producing what must necessarily be inferior fruit.

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Spraying versus Fumigation in Red Scale Control.

AN article under the above title, by Dr. F. S. Bodenheimer of the Hebrew University, Jerusalem, published in the issue of "Hadar" for December, 1933, is of considerable interest in view of the importance of the control of this scale in citrus plantations in Cyprus.

In this article it is stated that fumigation is the accepted method of control in Palestine of the more serious Black Scale (*Chrysomphalus aonidum*, L.) (which fortunately does not exist in Cyprus) but that Red Scale (*Chrysomphalus aurantii*) is mainly controlled there by spraying.

It is anticipated that a new system of fumigation will shortly be available in Palestine, when the expected establishment of a manufacturing plant makes available a supply of liquid hydrocyanic acid gas. This is the gas ordinarily used in citrus fumigation but its use in the liquid form is considered to offer several advantages over the methods of generating the gas under the covered trees with sodium cyanide and sulphuric acid, and the methods involving the use of calcium or other cyanides in dust or brickette form.

The difficulties hitherto in the way of the general use of liquid hydrocyanic acid gas in Palestine have been largely due to the difficulty of transporting the material owing to the necessity for its being kept at a temperature constantly below 15° C. added to the cost of such transport from the distant factories, but should a factory for the manufacture of this material be established in Palestine the greatest of these difficulties will be avoided, particularly as a new method of supplying the liquid in steel cylinders appears to have abolished the necessity for keeping the material at a temperature below 15° C.

The main difficulty in spraying is to ensure the proper application of the spray material, and if the spraying is satisfactorily carried out a good control of the scale can be obtained. It is considered that ordinarily one good spraying in the year, with a second spraying on more heavily infested trees, is sufficient to give satisfactory results. It is not ordinarily necessary in Palestine for the whole of a plantation to be treated against Red Scale, and in such cases spraying has advantages over fumigation, but where a whole plantation requires treatment, fumigation will probably be preferred in spite of the higher cost, owing to the greater degree of control which it gives. In years of heavy scale infestation, fumigation will probably be preferable, while in many plantations fumigation and spraying will be carried out in alternate years.

It is thus considered that fumigation and spraying will both be required by citrus growers, sometimes one treatment being applied and sometimes the other. H.M.M

Preservation and Hatching of Silkworm Eggs.

BY PH. CHRISTODOULOU, *Senior Sericultural Inspector.*

IT is well known from experience that silkworms hatched from silkworm eggs which have been hibernated in a cool place are more healthy and hardy than others.

A temperature of 0–5° C. is suitable for the hibernation of silkworm eggs, but moisture is detrimental to the proper preservation of the silkworm eggs and should be avoided.

Pedhoulas was selected by the Department of Agriculture for the natural hibernation of the silkworm eggs during the current season as it possesses the required conditions. Accommodation was arranged where all silkworm eggs locally produced and imported were taken for hibernation under the supervision of the Sericultural Inspector, Kalopanayiotis.

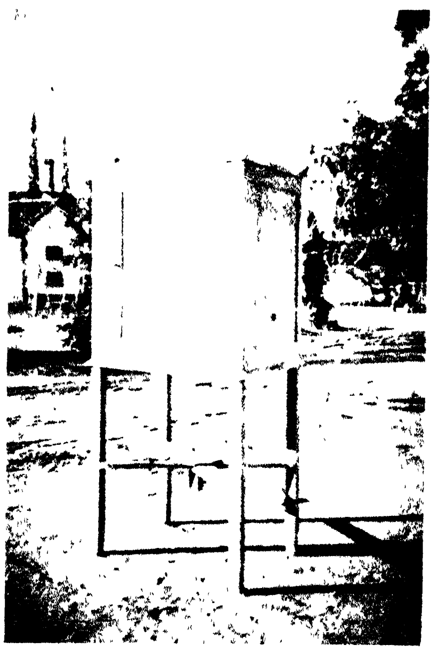

FIG. 1.—Double-walled incubator

In order to ensure, however, good results, the silkworm rearer, besides care in hibernation, should give special attention to the silkworm eggs from the time he acquires them until hatching, and generally during the whole course of rearing, until the weaving of the cocoons.

Rearers should note that from the beginning of February to the time of hatching the silkworm eggs are in need of proper ventilation; therefore, care should be taken to keep the silkworm

eggs in a well-aired cool and dry place avoiding sleeping rooms or places where lamps or fires are lit.

The hatching should coincide with the sprouting of the mulberry trees so as to ensure a supply of leaves for the silkworms immediately after hatching.

The sprouting of the mulberry trees varies according to the climatic conditions of each area; if the hatching takes place earlier the worms will die as there will be no mulberry leaves, whilst, if they are hatched late the leaves will be tough and rather indigestible.

The method of hatching in practice in many villages of the Colony is primitive but it is a general custom for the women to wrap the silkworm eggs in cloths and cotton and place them on their person or in their bed mattresses for hatching. Such methods are most unsatisfactory inasmuch as the eggs are devoid of the ventilation which is so essential besides the temperature is not steady, under such conditions many worms die and those surviving are weak and easily affected by diseases.

FIG. 2.—Double-walled incubator.

The method of hatching small quantities by the wooden incubator now in use for the demonstrational silkworm rearings in girls' schools gives very good results. It is a very simple appliance and can be made out of a petroleum box at a very small expense. The box incubator is divided into two or three

shelves (telara) and on every shelf a thin cloth is pinned or pasted over the shelf upon which the silkworm eggs are spread. The bottom shelf is of tin on which a glass or plate of water is placed and under the bottom shelf a receptacle containing olive oil and a tiny wick (idaré) is fitted. The wick is lighted so as to create the required temperature, if a higher temperature is required, two or more wicks may be lit at the same time (see Fig. 3).

The tin shelf when heated equalizes the temperature and the evaporation of the water facilitates the hatching of the eggs.

Proper scientific incubators should be used for larger quantities (80–100 oz.) (see Figs. 1 and 2).

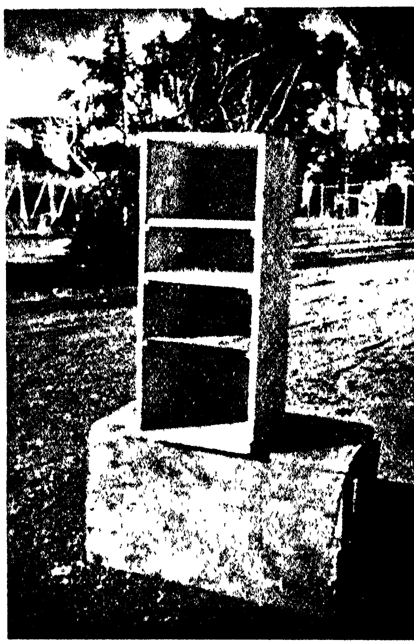

FIG. 3.—Wooden incubator.

The temperature in the incubator should at the beginning be 16° C. rising by 1° C. every day up to 23° C. or may be raised up to 25° C. without any danger of damaging the eggs.

The temperature should be regulated by means of a thermometer placed within the incubator but it should not be placed on the tin shelf.

During the course of incubation the eggs are turned over with a feather two to three times every day ; this permits the better ventilation of the eggs which ensures the simultaneous hatching which is a very important factor for good results.

The hatching usually lasts for four to five days and takes place during the early hours of the day. When the worms begin

to hatch the eggs should be covered with thin cloth (tulle) on which tender mulberry leaves are placed. The worms climb through the meshes of the tulle onto the leaves which are then carried to the rearing house; fresh leaves are placed on the tulle until all the silkworms are collected.

The reason why tulle is used is that it helps to cut the silk threads which accompany the worm on hatching; also it avoids removing unhatched eggs with the worms which would ultimately result in an uneven rearing.

The worms after hatching should be placed on the layers. In order to prevent the worms falling through the meshes of the layers, sheets of paper should be placed on the layers temporarily.

The system of placing the worms during the first days after hatching in sieves and covering them up is not recommended as it prevents proper ventilation of the worms.

Charcoal.

BY F. S. DANKS, *Assistant Conservator of Forests.*

THROUGH the ages charcoal has always played a very prominent part in the economic welfare of man. In more recent years it had developed into a considerable industry with many ramifications and by-products. As long ago as 1908, Hutchins, in his report on Cyprus Forestry, laid stress in the value of this product not only to the villager but also as a means of revenue to the Government. He also emphasized the scope for development and particularly drew attention to the fact that waste wood, stumps, branches, etc., could be very profitably converted into this commodity.

Charcoal is undoubtedly the most economical fuel for cooking purposes that one can obtain in Cyprus. Especially in this so in all tropical countries or where the summers are warm and it is undesirable to increase the heat of the kitchen unduly. No other fuel can claim such a virtue. It gives a quick ready heat which can easily be regulated by efficient air control. A good clean hard charcoal made from any of the Cyprus hardwoods such as eucalyptus, plane, ladja, etc., can be readily handled without soiling the hands, and the residue of ash is very small. There is no smoke and, in good charcoal, practically no flame.

The Cypriot still adopts the most antiquated methods of manufacture. His kiln is of the old "beehive" or tumulus type and, as a rule, does not give very good results. His product always contains considerable quantities of earth, moisture and other impurities. He loses a large quantity by imperfect

burning, and small material which is unsaleable, a very fair average yield does not give more than 15% (by weight) charcoal. Many of the more up-to-date countries are now using a metal portable kiln which can be used in the more inaccessible parts of their forests. The results obtained from these kilns have more than doubled the average yield obtained from the ordinary earth or tumulus kiln. In some instances the result has been as high as 33%. Recently the Forest Department built an experimental kiln of this type, designed by the writer. It is a small kiln which might easily be handled in sections by two men while only one man is necessary to supervise it when working. It holds between 4 and 5 tons of fuel and on its initial run gave a return of 30% charcoal. The kiln can be inspected at the Department's Timber and Implement Store at Nicosia Railway Station where it has been installed for preliminary trial, experiment and demonstration.

It is impossible to give all the advantages of the portable metal kiln over the tumulus or earth kiln. The most important principles are that the kiln can be operated on almost any site, under all weather conditions and at any season. No water is required and there is no danger from fire. The charcoal produced is hard, clean, free from moisture or other impurities and the yield is double that of the ordinary Cypriot kiln.

In many of the villages in Cyprus there are considerable numbers of fruit trees and in many cases I have seen the prunings from such trees burned as waste material. Very often the large material from the prunings would make a very excellent type of charcoal.

The size of the kiln is not of considerable importance, kilns can be made to hold from one ton up to 10 to 15 tons and be considered portable. A very convenient type for Cyprus would be one holding about 6–7 tons of wood and which would not require to be moved more than, say 4 or 5 times a year. Where frequent removals are necessary then a smaller type such as is used by the Forest Department would no doubt be more convenient, and this to be recommended. Personally I have obtained some excellent charcoal using a Public Works Department asphalt drum as my kiln.

The time factor is another consideration when contrasting the two methods of charcoal making. An earth kiln takes anything from 5–7 days to burn (and even longer if the weather conditions are adverse) whereas a metal kiln can be burned in 30 to 50 hours depending on its size and the grade of charcoal required. The average rate of burning can not be laid down specifically as different species burn at different rates, whilst a well seasoned piece of wood requires less time for carbonization than fresh material.

The size of the material is also an important factor, billets of more than 6 inches diameter are not acceptable as they retard the rate of charring and very often it is found that the core is incompletely charred.

The best temperature for the production of high quality charcoal is between 400–500° C. and a good operator has no difficulty in keeping the temperature within this gauge. The crucial stage is just at the point where carbonization is complete and carelessness on the part of the operator may allow "flaring" at one of the air spaces and consequently a very rapid rise of temperature in that area, often as much as 800° C. or more.

In recent years new industries are using more and more charcoal. The artificial silk factories absorb large quantities, chemists and druggists are using the finer grades as medicinal powders, corn dealers as animal and poultry food.

Engineering trade for case hardening castings, etc.

Fertilizers for lawns.

Filtration used for oil and water purification.

Fumigation.

Horticulturists use it in bulb growing, garden produce and flowers.

It is used as an insulator in cold storage, etc.

The motor industry uses large quantities in the manufacture of gear wheels as it is free from sulphur or phosphorus, it is also used for all non-ferrous castings as aluminium brass, etc.

Paint makers use it for vegetable blacks.

As will be seen from the foregoing charcoal plays a fairly prominent part in our industrial life and these examples quoted may be taken as only a small number of what might be given as I have only selected sufficient to show how widespread is the use of charcoal.

For a considerable number of years charcoal has been used as the material to produce gas for various types of gas engines and has always been considered very economical. In more recent years it has been used very successfully as the gas producer for motor lorries, decaville railway engines, etc., even more recently a modified type of producer gas has proved successful on private cars, the cost of running is infinitesimal when compared with that of petrol. When one considers that the price of charcoal in England varies from £5 to £7 per ton and that the price of charcoal in Cyprus varies from £1 to £3.6.6, it is obvious how economical this product must prove to be.

During the War, charcoal was the predominant anti-gas agent or factor. Towards the end of the War all gas-masks contained a certain amount of charcoal. This charcoal was manufactured from cocoa-nut shells, almond and other nut shells, it underwent a special process known as activation which

rendered it capable of absorbing large quantities of gas. To-day this activated charcoal is used as a deoderant and a decolourizing agent in the manufacture of sugar and of many oils.

Even at the present moment many types of gas-masks in common use contain charcoal for the absorption of gas.

On the subject of charcoal one can write volumes, and it is hoped that this brief, non-technical outline will give the reader a slight conception of a very valuable minor forest produce. A product which should prove invaluable as a Cyprus export product to the Near East markets where fuel is at a premium.

AGRICULTURAL CALENDAR.

APRIL TO JUNE.

WORK ON THE FARM AND IN THE GARDEN, VINEYARD AND APIARY.

April.

Farm Crops.—Normally reaping of barley starts towards the end of this month, therefore, farmers should examine their implements to see if they are in good working order and undertake necessary repairs.

Rust is often troublesome during this month and precautions should be taken to minimize the chances of this disease spreading. Excessive irrigation should be avoided.

If early potatoes are ready for marketing, they should be raised with care so as not to injure the skin. The main crop of potatoes should be hoed and earthed up with a heavy layer of soil so as to protect young tubers from the tuber moth. Potatoes should be sprayed with Bordeaux Mixture or Burgundy Mixture for *Late Blight* and *Early Blight.* All plants attacked by wilt disease such as *Fusarium Wilt* and *Black Leg*, and all plants showing symptoms of "Virus diseases" such as *Leaf Roll* or *Curl* should be pulled up and destroyed. This is especially important if it is proposed to use a portion of the crop for seed.

Broad beans, if approaching maturity, should be cut when the pods turn black.

Belgian and English flax starts to grow rapidly in April, and should be irrigated at least twice.

Fields which are intended for hemp cultivation should now be finally prepared.

Sowing of hemp may begin by the middle of the month.

Summer crops sown this month, normally give better results and the following may be sown: cotton, maize, sorghums, sesame, lucerne, cow peas, haricots, etc.

Live Stock.—The warble grubs under the skin of the backs of cattle should be gently squeezed out and destroyed as they become mature.

The regular dosing of sheep and goats with copper sulphate solution should be continued.

When the sheep nostril fly (*Oestrus*) is active, apply a small quantity of tar, or a mixture of tar and waste engine oil, on the noses of the sheep every two or three days. This can easily be done when the animals are leaving the "mandra," and the resulting protection from the fly will enable the flock to graze and thrive continuously.

When the flocks are hungry, avoid grazing on pasture where poisonous plants are prevalent.

Do not water flocks in standing pools.

Poultry.—Give poultry houses and yards a thorough clean out—the manure is valuable and its removal will help to keep down epidemics of diseases. If lice are present on the birds, provide dust-baths of road-dust or equal parts road-dust and sulphur.

Fruit Garden.—Planting of citrus trees may be continued, but early finishing of this work should be aimed at. The main work in the fruit garden is manuring and cultivation. Much good may be done to citrus trees by giving a thorough irrigation prior to the blossoming period, should the trees show any signs of drought injury. In addition, it is advisable to supplement the nitrogen content of the soil (usually at a low ebb at this season of the year) with a dressing of quickly available nitrogenous fertilizer, such as nitrate of soda or sulphate of ammonia. This should be applied at the rate of from 1 to 5 lbs. per tree according to age, the older trees, of course, receiving the larger quantity. No cultivation or watering should take place during the time of blossoming.

Spray apple and plum trees with Lead Arsenate as soon as the presence of the Sirividhi (*Hyponomeuta*) is observed, towards the end of the month. The spraying should be done before the insects have time to spin a thick web, and should be repeated after 10 or 14 days.

Apple and pear trees, known to be affected the previous year with Black Scale or Leaf Spot disease, may be given the first application of Bordeaux Mixture or Lime Sulphur. The fungicide should be applied just before the blossom buds open.

Vineyard.—Continue planting and grafting; make second cultivation; continue spraying with Lead Arsenate or Paris Green against Sirividhi (*Zygaena*) if this pest appears and repeat spraying after 10 or 14 days. Start sulphuring of vines as soon as the new shoots are 3–4 inches long. If Peronospora appears start spraying when shoots are 3–4 inches long. Bordeaux or Burgundy Mixture or a suitable proprietory spraying material should be used against Peronospora.

Vegetable Garden.—Onions should be weeded and, if the growth is well advanced, they should be hoed. The following seeds may be sown in well prepared and manured seed beds for transplanting later on: cabbage, celery, cauliflower, leek, tomatoes, capsicum; sow also cucumber, vegetable marrows, ladies-fingers, purslane, parsley cress, round radish, etc.; transplant early tomatoes, egg-plants, capsicums, etc. Melons and water melons may be sown for late production and early sown fields may be hoed and, if sufficiently advanced, may be earthed up.

Flower Garden.—Transplant summer flowering plants. All paths and beds should be hoed and kept clean.

Apiary.—Hives which swarmed early can still be transferred to frame hives. Hives should be inspected and frames with foundation sheets should be added where required.

Bee-keepers should be on the look out for swarming which takes place freely this month.

May.

Farm Crops.—Harvesting of barley should be in full progress and early varieties of wheat ready for reaping. If rain occurs at harvest time any sheaves in the field should be turned and well dried before stacking in readiness for threshing.

Cereal fields should be visited and best representative ears should be selected for production of selected seed for future use.

Give second spraying of potatoes with Bordeaux or Burgundy Mixture for control of Early and Late Blight. Potato lifting now in progress.

Potato leaves and stems should on no account be used for covering heaps or baskets of tubers after harvesting owing to danger that this will lead to the tubers being attacked by tuber moth. The tubers should always be kept well covered to protect them from such attack.

Irrigation of imported varieties of flax should be discontinued as soon as the flax is in full blossom. As soon as the stalks of local varieties begin to show a yellowish colour, flax for fibre should be pulled. If for linseed only, the flax should be left standing until the seed fully matures. Sowing of maize, lucerne and other fodder crops may continue.

Live Stock.—Continue to dose sheep and goats with Copper Sulphate solution at frequent intervals and to apply tar dressings to prevent the attack of the nostril-fly.

Watch for early cases of Anthrax and bury carefully the carcases of any animals which may have been infected—at this time the disease must be suspected in every case in which an animal dies after an illness of less than forty-eight hours.

The annual vaccination campaign against this disease will be now in progress and owners should take care that every animal in their flocks is treated by the vaccinator.

When possible, do not feed animals with decayed or musty straw, as this is likely to cause colic and other digestive disturbances. If such straw must be used, place it in a bucket and pour boiling water over it. After three or four minutes, pour away the water and the straw may then be fed without much danger.

When threshing commences, do not allow animals to eat excessive quantities of the sheaves on the threshing-floors.

Poultry.—Special care should be given to poultry and poultry houses as insects now begin to give a lot of trouble.

Fruit Garden.—Irrigation of citrus trees should be discontinued until after the setting of the fruit.

Continue sprayings against Sirividhi of Apple (*Hyponomeuta*).

Spray melon plants with Lead Arsenate if they show signs of damage by the leaf-eating beetle (*Aulacophora*).

Other spraying, either with a contact poison such as nicotine, against insects sucking the sap of plants, or with internal poison, usually an arsenical, against insects eating the leaves, should be carried out as required, always remembering that the earlier the spraying is done, the more effective it will be.

Second spraying of apple and pear trees with Bordeaux Mixture or Lime Sulphur for control of Black Scab or Leaf Spot. The fungicide should be applied after the petals have fallen.

Peach trees and nursery stock of both peach and almond trees may be sprayed with Lime Sulphur or powdered with sulphur if attacked by the Powdery Mildew.

Vineyards.—Third hoeing and weeding should be given. Second spraying against Peronospora and second sulphuring against Oidium. It is recommended to spray first and sulphur after spraying. Spray vines with Lead Arsenate against Eudemis. The first spraying should be done 3 or 4 days before the flowers open and a second spraying should be given 10 to 14 days later. Cut out superfluous young shoots.

Vegetable Garden.—All summer vegetables in the absence of rains require frequent irrigation. Cabbage, celery, cauliflower, leek and other vegetable seedlings, if sufficiently mature, should be transplanted to well prepared beds.

Spray celery with Bordeaux or Burgundy Mixture if Celery Blight (*Septoria apii*) makes its appearance.

Flower Garden.—Watering of seeds and plants is very important. Special care and attention should be given to dahlias and chrysanthemums ; hyacinths, tulips and other bulbs required for replanting in autumn should be uprooted and stored.

Apiary.—Attend first to the strong hives by providing plenty of ventilation and protection from the direct rays of the sun. Remove defective combs to make room for rapid expansion, give frames with wired full sheets of comb foundation and add a second storey if and when necessary.

Examine every ten days and add frames with comb foundation when necessary, trying always to keep a little ahead of the bees and thus swarming will be minimized; swarming, although multiplying the number of hives, yet forfeits their capacity for honey production. If swarming cells are observed in any hive, destroy them and cage the queen for ten days; then release her and kill any swarming cells that may exist. Increase, if desired, may be effected by "dividing" when convenient to greater advantage than by allowing swarming to occur.

If in spite of all precautions a swarm or two issues, hive it on the old stand, in a new hive containing frames with starters, or preferably full sheets of comb foundation; remove the parent hive to a distance in order to catch all the flying bees with the swarm and thus second and third swarms are automatically prevented. Second or third swarms, far from serving any good purpose, ruin their parent hive by depopulating it.

Weak hives may be given as a start a frame or two of hatching brood with honey which may be spared from some strong hive. If necessary, reduce the number of frames to a number which can be conveniently covered, until it revives when it may be enlarged by adding full sheets of comb foundation, as required.

Should the season be dry, bees may not find much to collect to meet their spring requirements, and, therefore, it is advisable that the needy, irrespective of whether weak or populous, should be fed with a thick syrup consisting of two parts of sugar to one water to keep them fit until the main honey-flow. In localities where lemon and orange groves are in abundance, feeding may be dropped at flowering time.

June.

Farm Crops.—Work in the harvest fields should not be delayed on any account as thunderstorms are liable to cause damage to any standing crop. Animals may be grazed on stubble, but ploughing should be done before the ground becomes too hard as it is essential the land should be ploughed at this time as a preparation for next year.

Seed corn should not be selected from crops which are known to be infected with the following diseases:—

Loose and Covered Smut of Barley, Loose Smut and Bunt of Wheat, Loose Smut of Oats.

All these diseases may be carried with the seed,

Potato lifting should be done with great care. Keep growing tubers well covered with soil to avoid attacks by Tuber Moth (*Lita*; *Phthorimœa*). Rooms in which it is intended to store potatoes should be thoroughly cleaned and limewashed and all cracks closed up, or the rooms should be fumigated.

Flax which had been pulled in May or earlier, may be de-seeded after having been stacked in the field for about six weeks. Imported varieties normally should be ripe for pulling, and must be closely watched for the first signs of maturity which are dropping of leaves, and the stalk acquiring a yellowish tint. Pulling should not be delayed till the seed is fully mature. As soon as de-seeding has been completed, retting should begin before the retting water becomes too warm.

Cotton fields should be hoed and the plants thinned out, allowing two plants to remain at each point.

Continue to watch and spray against insect pests, particularly aphis on cotton, which should be sprayed with nicotine or other contact poison.

All summer crops should be hoed and be given the required irrigation.

A late crop of maize may still be sown.

Live Stock.—The health recommendations for May should be followed in this month also, special care being taken in the proper burial of carcases of animals which may have died from Anthrax.

The application of tar or a mixture of tar and oil on the noses of the sheep to keep off the *Oestrus* fly will enable the flock to graze and rest in comfort, and the sheep will consequently show a general improvement in condition.

Flock-owners, who have already seen the value of dipping, should continue to dip their sheep every three or four weeks for the destruction and prevention of parasites and the improvement of the wool.

Poultry.—Owners of poultry should now be watchful to observe early cases of Fowl Cholera and other infectious diseases. Any sick birds should be isolated immediately, and if they die, the carcases should be burnt or buried. For definite information in regard to the cause of the disease and the methods of prevention, apply to the nearest Stock Inspector and, if possible, send a carcase to the Veterinary Office at Nicosia for examination.

Renew the drinking water very frequently in the poultry yards and keep the poultry houses thoroughly cleaned as the heat favours insects.

Fruit Garden.—All fruit gardens should be thoroughly hoed so as to preserve moisture and keep down weeds. Budding continues. Remove the shoots below the grafts and buds.

In the case of young citrus trees the tendency is to allow the stock to become too thick before budding. Budding should normally be carried out in the nursery when the stock is from $\frac{3}{8}$ to $\frac{1}{2}$ inch thick. The height of budding should be from six to eight inches. Growers are strongly advised to persevere with the "Bitter Orange" as a stock in preference to the "Sweet Lime" or "Sweet Lemon." The importance of taking budwood from current years' wood off a fruiting branch, from a tree carrying large quantities of fruit of desirable type, is emphasized. Buds from sucker growths and "waterspouts" should on no account be used.

Fumigation of citrus trees against red scale commences, and also spraying with white oil emulsions against the same pest.

Traps for *Ceratitis* should be hung in apricot, kaisha, and peach trees. Fallen fruit of these trees should be collected daily and buried, and also fallen fruit of apple, peach, pear, plum, quince and walnut trees against *Carpocapsa.*

Vineyards.—Second sulphuring and spraying against Oidium and Peronospora continues. This work should be done at the moment of flowering. Second spraying against Eudemis should be done 3–4 weeks after the first spraying. Continue weeding where necessary.

Vegetable Garden.—Transplanting of cabbages, cauliflower, celery and leeks may continue.

Melons, cucumbers and other cucurbits should be lightly dusted with sulphur to control the powdery mildew. If the downy mildew makes its appearance, spraying with Bordeaux Mixture should be resorted to.

Flower Garden.—Increase watering which should be done preferably in the evening. Sow autumn flowering plants.

Apiary.—During June and July bees collect surplus honey. Every care should now be directed to seeing that they are in possession of sufficient combs for the storage of this honey, and full sheets of comb foundation should be given as required.

Weak hives may be brought close to each other, by moving them a yard daily and they may then be united at the beginning of the honey-flow, if surplus honey at this season as well as strong hives for next spring are desired.

Ventilation and protection from the direct rays of the sun are now required by the bees.

A dry spring is unsuitable for queen-rearing, but it may be practised advantageously now at the beginning of the honey-flow, but as few hives as possible should be employed. The young queens should be detained in their mating nuclei and introduced in August or September to those hives that need re-queening.

EDITORIAL AND ADVERTISEMENT NOTICES.

All communications for publication should be addressed to the Editor *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

Copies of the *Cyprus Agricultural Journal* can be obtained on application to the Department of Agriculture, price *3cp.* per number, or by post *4cp.*

Annual subscription payable in advance 16*cp.* post free. Overseas subscription 18*cp.* (2/-).

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A uniform reduced rate is charged for all advertisements which covers their insertion in the English, Greek and Turkish issues respectively.

As special efforts are being made to increase the circulation of the Journal in the Colony and Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force :—

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The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

JANUARY, 1934.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall: Total inches	No of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District							
Nicosia	56.26	41.13	5.96	10	2.90	3.82	—
Athalassa	—	—	4.60	7	2.05	3.65	—
Morphou (C E F)	58.77	57.77	5.51	9	1.79	2.62	—
Makheras	—	—	7.44	9	1.57	7.71	—
Famagusta District							
Famagusta	60.87	42.06	3.88	10	1.30	4.91	—
Akhyritou	57.90	39.04	3.09	8	1.14	3.68	—
Rizokarpaso	—	—	7.36	8	2.70	5.40	—
Lefkoniko	—	—	3.09	7	0.95	4.05	—
Larnaca District							
Larnaca	60.60	43.04	3.75	9	1.52	5.79	—
Lefkara	—	—	3.80	7	1.05	5.59	—
Limassol District							
Limassol	60.58	43.84	3.02	10	0.75	5.12	—
Saittas	—	—	4.25	9	1.23	6.30	—
Trikoukkia	—	—	4.98	11	1.76	6.68	11, 19, 20, 29
Alekhtora	—	—	2.30	10	0.82	4.75	
Paphos District							
Paphos	66.93	58.03	2.45	9	0.76	4.98	—
Polis	—	—	1.90	9	0.80	4.49	—
Kyrenia District							
Kyrenia	61.32	48.16	9.39	12	3.00	4.76	—

FEBRUARY, 1934.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall: Total inches	No of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District							
Nicosia	56	39	3.71	14	1.24	3.04	—
Athalassa	—	—	3.30	10	1.12	2.38	—
Morphou (C E F)	58	38	3.56	11	1.72	2.88	—
Makheras	—	—	7.45	6	3.15	5.17	16th
Famagusta District							
Famagusta	61	43	4.95	10	1.20	3.47	—
Akhyritou	58	39	3.08	12	0.66	2.67	—
Rizokarpaso	—	—	5.86	16	1.05	4.91	—
Lefkoniko	—	—	2.91	13	0.90	3.05	—
Larnaca District							
Larnaca	63	41	3.29	13	1.00	3.58	—
Lefkara	—	—	4.47	12	1.07	4.25	—
Limassol District							
Limassol	59	42	4.45	16	1.52	3.34	—
Saittas	—	—	3.41	12	1.10	—	—
Trikoukkia *	—	—	—	—	—	—	—
Alekhtora	—	—	5.28	14	1.12	4.00	—
Paphos District							
Paphos	69	62	4.79	14	1.00	4.31	—
Polis	—	—	3.98	11	1.10	4.05	—
Kyrenia District							
Kyrenia	65	54	4.82	12	1.24	5.82	—

Note —Compiled from returns taken by Public Works Department

* Return from Trikoukkia not yet available.

CONTENTS

INTENSIVE CULTIVATION AT KYTHREA [Photo by R. M. Nattrass.

The Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXIX, Part 2 JUNE, 1934 Price 3cp.

EDITORIAL NOTES.

DURING the past three months conditions have been dry on the whole with occasional local heavy storms culminating in general rain in the middle of the barley harvest. The good promise of the early months of the year has not been entirely fulfilled, nevertheless cereal crops are the best reaped during the past four seasons. Some hail damage to cereals was experienced in parts of the Nicosia District in April. The prospects for summer crops are reasonably good, although underground water supplies are not up to the normal in several areas, particularly in the Paphos District. Aphis has done a considerable amount of damage to broad beans and vegetable crops.

* * * * * *

Sir Ralph Oakden, C.S.I., O.B.E., Financial Commissioner, accompanied by Mr. C. F. Lee of the Colonial Office, is now in Cyprus. Mr. F. A. Stockdale, C.M.G., C.B.E., Agricultural Adviser to the Secretary of State, left the Island on 7th June after a visit of nearly 4 weeks. Primarily concerned with the question of rural indebtedness, Mr. Stockdale has found time closely to examine all the important phases of the Agricultural industry of the Colony. Mr. Stockdale, it will be recalled, visited Cyprus for a short period in the spring of 1931 and is, therefore, able to compare conditions now with those pertaining on his last visit. The very helpful discussions which have been had with him have been of great interest and will be of equal value to Cyprus agriculture, and his wide experience of agricultural matters in other Colonies has been freely placed at our disposal. The Financial Commissioner's report will be awaited with the greatest interest.

Visits have been paid by members of the staff of the Department to two important Conferences in Italy. The first, a Congress of Wine Experts called together by the International Institute of Agriculture, with the objects of drawing up a plan for the unification of the methods of presenting the results of analysis of wines, was attended by the Viticulturist and Wine Expert, Mr. P. Antoniades. A note on the Conference appears elsewhere in this issue. The second was the World's Dairy Congress, held in Rome and Milan. The Cyprus representatives were the Assistant Director of Agriculture, Mr. A. Pitcairn, and Mr. C. Koumides, Agricultural Assistant. These Conferences, apart from the value of the actual discussions that took place, are of great value to the representatives attending them in that these officers are enabled to compare methods adopted in other countries with those in Cyprus and on their return to introduce more modern practices, thus enabling the local industries to compete on equal terms with other competitors in foreign markets. A note by Mr. P. Antoniades on his impressions of Italian viticulture appears elsewhere in this issue.

* * * * * *

The Annual Spring Sale of Surplus Stock was held at Athalassa on 4th April, and was well attended. Unfortunately owing to a suspected case of abortion no cattle could be offered, but prices realized for other stock were satisfactory. Villagers attended from Limassol, Larnaca and Kyrenia as well as from Nicosia District and evinced a keen interest in the various activities and in the stock of the Farm.

A milking table for goats, demonstrated for the first time, attracted a considerable amount of attention.

* * * * * *

WINE NOTES.

The growth of the vine this year, though starting a little later than normally, was helped by the favourable weather during April and May and is now superior to the normal vegetation at this season.

Vines look vigorous and healthy almost everywhere. A few cases of chlorosis are noted here and there in calcareous soils and in vines which suffered severely from drought followed by the satisfactory rains and extravagant growth of this year.

Flowering was abundant and if the setting of the flowers is normal a satisfactory crop is to be expected.

In any case the crop is expected to be better in quantity and quality than that of last year.

INSECT PESTS.—*Zygæna Ampelophaga* has appeared on a very small scale in some localities but owing to the rapid development of the vegetation, favoured by the weather, it has not done any appreciable damage.

Cecidomyia has been met here and there, mainly in Paphos District, but not in sufficient abundance to cause any damage.

Eudemis.—The first generation of the grape berry moth appeared early in May in abundance in the lower parts, on a small scale on the hills. Already the second generation has made its appearance in the lower parts. As vine growers are not in a position to give the necessary treatment and fight against this pest, considerable damage may result, especially if the summer is damp.

FUNGUS DISEASES.—*Oidium* has not yet appeared. Sulphuring has been done everywhere by the growers. There is no sign of *Peronospora* notwithstanding the favourable rains during May. The danger is not, however, yet over but an outbreak is now considered unlikely.

* * * * * *

PAPHOS NOTES.

A demonstrational planting of cherry trees, undertaken by the Agricultural Department at Ayios Nikolaos, Paphos, is producing satisfactory crops this season. It is to be hoped that this profitable cultivation will now be extended in this area.

* * * * * *

In spite of the better rainfall this year, underground water supplies in parts of the Paphos District appear to be scanty, and there are local shortages of water for domestic purposes and for irrigation.

* * * * * *

Conditions have been very favourable for silkworm rearing and the quality and production of cocoons good. Owing, however, mainly to the position in Japan and reduced purchasing by America the value of silk has fallen in the world's markets to an abnormally low level. At such a price as can be offered by the Filature, viz., 6*cp.* per oke at the factory, it is not expected that any large number of cocoons will be purchased and the Filature may have to close down. The export duty which was imposed on cocoons in 1933 has been removed by Government, but it is not expected that prices appreciably higher than those offered by the Filature can be paid for cocoons for export.

VETERINARY NOTES.

During the winter and spring months skin parasites of sheep and goats were abnormally prevalent and increasing interest was taken by flock-owners in the demonstrations of dipping as carried out by the veterinary staff in all districts. There was an unusual demand for the dipping powder, which was issued free of charge, and the successful results have been so apparent that several villages and individual flock-owners have now constructed proper dipping baths.

* * * * * *

The annual vaccination of live-stock for the prevention of Anthrax (Phlangara) commenced on the 11th April and over 440,000 animals had been treated on the 31st May. It is expected that the work will be completed by the end of June and that the total number of animals vaccinated will exceed 500,000.

Reports from all parts of the Island show that the results of the vaccination last year have been most satisfactory. Outbreaks of Anthrax are now of comparatively rare occurrence, whereas up to a few years ago the disease used to cause the death of from 10 per cent. to 30 per cent. of the flocks in many areas and a total loss to the Colony of more than £20,000 per annum.

The total cost of the vaccination service, including cost of the vaccine, is now less than sixteen shillings per thousand animals treated. The vaccine now being used is prepared at the Veterinary Laboratory, Nicosia. Prior to 1932 the vaccine was imported and the cost of the work was then over £3 per thousand animals.

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NOTE ON THE SUMMER PRUNING OF OLIVE TREES.

Important research work, recently carried out in Italy on the physiology of the olive tree, has produced results of considerable practical importance to olive growers.

It has been shown that, with detached branches of the olive tree, shrinking of the fruit is brought about by loss of water through the leaves.

In a dry season, therefore, shrinking of the fruit and fruit drop may be brought about by loss of water through the leaves. This loss may be lessened if the total leaf surface of the tree is reduced. Summer pruning, especially the removal of water sprouts, such as is practised in South Italy, is considered highly desirable and might, with advantage, be carried out by farmers in Cyprus during dry seasons, especially on trees on light land subject to drought. By limiting the leaf surface during a water shortage a better yield will probably be assured.

Spring fertilizers containing rapidly available nitrogenous manure, such as sodium or calcium nitrate, by increasing the leaf surface may in a dry season cause greater loss of water than the roots can supply, and water will consequently be withdrawn from the fruit. This will result in shrivelled fruit, fruit "drop" and reduction in yield at harvest. Nitrogen should, therefore, be applied sparingly where dry conditions are to be expected.

* * * * * *

WINE CONFERENCE.

The International Committee of Experts to study the unification of the methods of wine analyses held its meeting at the International Institute of Agriculture, Rome, on the 9th, 10th and 11th April, 1934.

There were represented at the meeting the following countries:—

> Algeria, Chili, Spain, United States, France, Greece, Hungary, Italy, Switzerland, Cyprus—also the International Office of Wines (Paris), the International Institute of Agriculture and the Society of Nations.

The members proceeded to the discussion of the methods of analysis after dividing the discussion into two parts:—

> (*a*) Summary and rapid methods of analysis allowing the laboratories of control or customs to check or test wine rapidly and uniformly so as to facilitate commercial transactions.
>
> (*b*) Rigorous methods of detailed analysis, in the case of suspected wines or in cases of contestation between the contracting parties in the trade.

The resolutions adopted by the Committee, after the discussion concerning the methods recommended to be used, are contained in detail in a "General Report" which has been submitted to the respective Governments for approval. After such approval has been obtained, a meeting of diplomats will sanction these resolutions for general and obligatory use in all transactions in trade in wines, by all official laboratories for the analysis of wines, and the methods adopted will be published in due course.

* * * * * *

ENTOMOLOGICAL NOTES.

Locust Campaign.

The hatching of locusts commenced rather later than the average date of the past few years and the appearance of the young locusts was first reported on 20th March. The hatching was irregular and, as in the previous year, locusts of very different sizes and ages were found together.

Purchasing centres were opened during April, six centres only being opened, at Phrenaros, Akhna, Pyla, Athienou, Neokhorio and Dhenia. The centre at Athienou was closed after a few days and centres at Ayios Andronikos and Lapathos were subsequently opened for a few days. The centre at Pyla was subsequently moved to Kondea. All centres, except Akhna, Neokhorio and Dhenia, were closed by 12th May, the centre at Dhenia being moved to Argaki on the 19th May, and the last centre was closed on the 26th May.

The occurrence of locusts has been still less than last year, and is the smallest for many years, the total purchases of locust having been only 1,338 okes.

Sirividhi of the Vine.

Attacks on vines by the Sirividhi (*Zygæna ampelophaga*, Bayle) have been reported from a number of areas, but on the whole this insect does not appear to have caused as much damage as last year. Arrangements were as usual made to assist spraying operations against it.

Sirividhi of Plum and Apple Trees.

Spraying was carried out as usual, particularly in the Marathasa villages, against the Sirividhi of plum and apple trees (*Hyponomeuta*). A trial of petroleum emulsion spraying in the winter against this insect gave encouraging results and will be further tested.

Potato Tuber Moth.

Special arrangements were made for officers of the Agricultural Department to visit potato-growing areas during the time the potato crop was being harvested, to instruct growers in the precautions to be taken to avoid attack on the tubers by the tuber moth, as it appears that a considerable proportion of the attack on tubers in the past has been due to neglect of precautions at the time of harvesting and during the early storage. The instructions given appear to have been successful in causing a noticeable reduction in the attack.

Flax Dodder, a recently observed Pest in Cyprus.

By R. M. NATTRASS, *Government Mycologist.*

A SERIOUS pest of flax, a parasitic plant known as the Flax Dodder (*Cuscuta epilinum*), has recently appeared in various flax raising-districts in the Island. It has, so far, been found only on a certain variety known as "J.W.S." which has recently been introduced. None of the local varieties has been attacked up to the present. It seems likely, therefore, that this dangerous parasite has been imported and distributed with the seed of this flax.

FIG. 1.—Flax plants attacked by dodder. X 2½ approx (original)

When once established the flax dodder is extremely difficult to eradicate and, unless steps are taken immediately by all farmers on whose land it appears, the cultivation of flax in infected areas may become unprofitable.

The dodder plant can easily be recognized. It consists of a thin wire-like stem, with minute clusters of flowers but no leaves, which twines spirally round the stem of the flax plant. (Fig. 1.)

The dodder plant obtains its nourishment from the flax plant through numbers of minute suckers which pierce the stem of the flax. Once firmly established on the flax the dodder has no connection with the soil and is consequently entirely dependent on the flax, which soon becomes exhausted and dies.

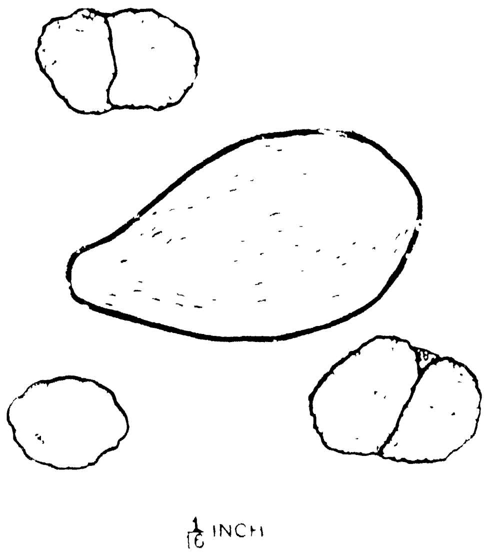


FIG. 2.—Seed of flax and flax dodder drawn to scale for comparison.

The flowers of the dodder produce large numbers of seeds which are much smaller than the seeds of the flax and consequently easily pass unnoticed in a seed sample unless especially looked for. They can with the aid of a magnifying lens be easily identified with a little practice. The young plant in the seed is a minute coiled thread wound round the food reserve in the seed. When the seed germinates the coiled thread unwinds, the root end becomes fixed in the soil, the remainder lengthening until a flax plant is reached. If a flax plant is not within reach the seedling withers and dies. On reaching a flax plant the young dodder winds round the stem to which it becomes firmly attached by means of its suckers. Connection with the soil is now severed and the dodder becomes entirely dependent on the flax. The dodder at this stage stretches out its thread like stem to the neighbouring plants until large patches become attacked. Flowers are produced abundantly and seed is formed which, falling to the ground further contaminates the land. Each year the area of the infested ground becomes larger until the whole field or district may become involved. It is important to remember that small fragments of the living dodder plant can act like shoots or cuttings and, if carried to other parts of the field, may set up fresh centres of infection.

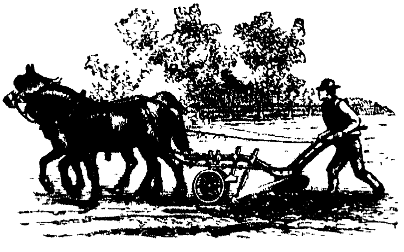
CONTROL MEASURES.

To prevent the parasite from obtaining a footing on clean land it is important that no seed from an infected farm should be sown.

When dodder is found infesting a crop steps should at once be taken to destroy it. This can best be done by digging up the attacked plants and burning them *on the spot.* This can be done by digging up the plants, covering them with straw or chaff, sprinkling liberally with paraffin and firing. The plants should on no account be moved for burning as seed or small pieces which fall to the ground will serve to spread the pest.

The seed of the dodder will remain viable in the soil for many years. Land which has once been infected should not be sown with flax for at least eight years.

There are many species of the dodder which attack various cultivated plants. *Cuscuta epithymum* is common in Cyprus, attacking wild plants such as furse, thyme, etc., but it does not attack flax or clover. The flax dodder is confined chiefly to flax but on the Continent of Europe it is known to attack hemp and certain species of *Camelina*.



The importance of Forests in mountainous Countries, with special reference to the hill Forests of Cyprus.

BY G. W. CHAPMAN, *Assistant Conservator of Forests.*

ALTHOUGH in recent years many people in this Island have come to realize the value of the forests in Cyprus, yet it is possible that many may be interested to learn further details as to the extent and the directions in which the beneficial influence of forests is exerted. A knowledge of the scientific reasons controlling these influences, over and above the generalities of popular belief, is essential if the value and importance of forests, especially in the dry countries of the Mediterranean region, are to be thoroughly appreciated. That forests can influence both climate and water supply is generally recognized ; few, however, are aware of the reasons governing this relationship.

For many years foresters and scientists have given these questions exhaustive study, and results from several countries have been correlated. The work of Ebermaier in Germany and Mathieu in France has brought conclusive evidence of the effect of forests on air temperatures for instance. They have demonstrated that yearly mean temperatures are lower in forested areas than in similar areas in agricultural regions, and that month by month this difference is much more marked in summer than in winter. Further experiments in France with the aid of observation balloons have extended the field of research to elevations reaching 5,000 feet above ground level, and have shown that the influence of forests in lowering the temperature, and at the same time in increasing the humidity of the air, is reflected even at these considerable heights.

The differences of temperature are limited to a few degrees only, but it is on air humidity that the reduction of temperature, even though so slight, has its most important effect. That warm air is capable of carrying more moisture than cold is one of the elementary teachings of physical chemistry, and from this we may deduce that the cooling effects of forests tend to reduce the moisture capacity of the air. Consider for example the case of a warm wind passing over bare open country to a region of forests ; the natural effect is that the air becomes cooled and is compelled to yield up some of its moisture, with the result that the lower air stratas become damper with conglomerating particles of moisture ; clouds may form on even rainfall, depending on the degree of suturation of the incoming air. The action is analogous to the condensation of human breath on the cold surface of a mirror. Mountains, of course, exercise the same effect to a much more marked degree, as can be seen here in Cyprus. The general effect, however, of forests on climate through air temperatures is not so much as a direct factor, but rather as a contributary influence on the circumstances leading to atmospheric precipitation.

While, therefore, we cannot admit that forests directly "create" rain, in hilly regions they certainly assist in increasing precipitation by the purely physical action of the branches and leaves in retarding the passage of clouds and by exposing much greater surfaces for condensation of cloud moisture. Statistics, collected by Dr. Faber in Germany, have demônstrated that the tree-clad mountain attracts more rain than another devoid of forest growth. Moreover in seasons where rainfall is naturally scanty the shade afforded by the forest canopy and by the leaf litter on the ground beneath shields the soil from the direct rays of the sun, thereby reducing radiation and evaporation, and the consequent drying out of the soil.

The forest cover may be likened to a blanket, for just as a blanket soaked in water can hold in its tissues far more than other thinner materials, so does the forest absorb and retain more moisture than any other form of vegetation. This brings us to the consideration of forests in their relation to water supply, a consideration of great practical importance in a dry country such as Cyprus, where water is a controlling factor in the development of its agriculture.

In mountainous and hilly countries the supply of water in streams and rivers is derived partly from springs and partly from surface drainage after rain. Of the two sources, the latter is less beneficial from the point of view of an agricultural community than the former, since the supply is of a temporary nature dependant entirely on the rainfall. If this should be seasonal such as is the case in Cyprus, the natural result is that the rivers themselves become seasonal, unless the supply can be maintained by spring flow. By checking surface "run off" and increasing the water retaining capacity of the soil, forests tend to raise the volume of spring flow at the expense of surface drainage, for the leafy canopy first breaks the fall of the rain, which is then absorbed by the spongy organic substances in the leaf litter and in the soil. Thence by a process of gradual seepage and underground drainage this soil water gathers in volume and emerges eventually as a spring. Direct proof of the influence of forests on spring flow are forthcoming from many parts of the world, though the classical example is the Bhopa mountain in Burma, an isolated peak rising from the central plain, and at one time densely covered in forest. All the forests were cleared and then it was discovered that the springs were beginning to dry out; their flow was only restored after the mountain had been reafforested.

Surface drainage water is not only less useful for general agricultural purposes, but often causes real harm by flooding, eroding gullies and washing away the soil. In Cyprus we have evidence on all side of the erosive action of such winter torrents. That forests do provide a safeguard against this form of destruction has been demonstrated scientifically in various

countries, but the work of Dr. Engler in Switzerland is probably the most widely known. This famous forester selected two neighbouring and closely similar valleys in the Immenthal district, one of which was densely forested and the other but lightly wooded. In these he kept careful meteorological records and measurements of stream flow over a period of nearly twenty years. The general results of his observations established definitely that the streams in the well-wooded valley had a greater and more constant flow during summer, while the "run off" after rain was 50 per cent. less than in the other valley. The degree of erosion determined by examination of the material carried down by the streams in each of the two valleys, was shown to be much greater in the poorly-wooded valley. Another instance nearer to hand is the fire which burned a considerable area of Troödos Forest, near Kakopetria, in the summer of 1932. The stream which has its source in the burned area was previously insignificant, but in the following winter, the rain water being no longer held back by the forest caused this small stream to descend in a powerful torrent flooding the fields and vineyards adjacent to the forest, strewing them with bolders and debris and causing considerable damage. This is but a small example of the processes at work regularly elsewhere, where former forests have been destroyed leaving the hills naked except for a few bushes and scattered shrubs powerless either to check the force of surface drainage or to retain sufficient water in the soil for the maintenance of the springs.

The forest has been likened to a blanket and the simile can be extended to embrace the action of forests in their relation to water supply. Let us for example compare the case of well-wooded hill and a bare hill to two small rocks, the one covered by a blanket and the other left bare. If a pail of water be thrown over each, what is likely to be the result? From the bare rock the water will cascade off rapidly and after a short time in the sunshine no trace of the water will remain. But on the other rock, most of the water is absorbed by the blanket (which represents the forest), from which it issues slowly in small trickles, this rock remaining moist long after the other has become dry.

In Cyprus the blanket of our forests has become sadly frayed and worn, following centuries of abuse and wasteful handling. Time, money and scientific management are required for their recovery, but above all protection must be secured against the agencies which are even yet most active in their destruction. A widespread interest in and appreciation of the value of forests to Cyprus by all classes of the people, together with an understanding of the difficulties and the problem involved, must be the first and greatest achievement in the task of restoration.

Mulberry Leaves as Food for Silkworms.

BY PH. CHRISTODOULOU, *Senior Sericultural Inspector.*

THE only food for silkworms is mulberry leaves and the development and vigour of the silkworms are unquestionably dependent on the treatment they receive. When inadequate food is supplied their health is affected and they become an easy prey to diseases.

It is, therefore, essential that the silkworm rearers should, in the first instance and prior to their obtaining their supply of silkworm seed, calculate the quantity of worms that their stock of leaves can maintain and on no account obtain more than that quantity. It is much better that there should be a surplus of leaves rather than a deficiency. Unfortunately there are certain silkworm rearers who, without having any leaves of their own, undertake rearings in the hope of finding the requisite supply of leaves later, but, on failing to do so within their village, they are compelled to carry leaves over a long distance, sometimes 15–20 miles, and this results in inadequate feeding.

These rearers should realize that such a procedure is detrimental to the worms and to their own interest as leaves carried over such a long distance will, undoubtedly, deteriorate, and worms brought up on such leaves cannot but be affected by diseases; furthermore, when the worms are inadequately fed they very seldom go to the twig or if they do so, the cocoons woven are very inferior both in quantity and quality. The average production under these circumstances seldom exceeds 15 okes per ounce of silkworm eggs, as against 40–50 okes in the case of a proper rearing. The highest production of cocoons realized in the demonstrational rearing in girls' schools during 1933 amounted to 69¼ okes per ounce of silkworm eggs.

Silkworm rearers should concentrate their attention on the quality of mulberry leaves also, since it is only in the case of worms fed on good quality leaves that the best results in cocoon and silk production are realized; silkworms growing on defective leaves can not derive the requisite elements for their proper development.

The nutritional value of mulberry leaves depends chiefly on the ingredients of the soil on which the tree is grown and the treatment it receives. Externally healthy leaves are distinguished by their deep-green colour, their sticky surface and their inelasticity and fragility.

A healthy mulberry tree retains its leaves until the beginning of winter. If the leaves lose their bright colour and turn yellow before this time, this should be taken as a sign that the soil is poor in nutritional substances and steps should be taken to replenish them by adequate manuring, otherwise the leaves next year will be shrivelled and not quite suitable for silkworm rearing.

GATHERING, PRESERVATION AND DISTRIBUTION OF LEAVES.

Silkworm rearers should pay particular attention to the condition of the leaves before they are given to silkworms; wet dusty or pecked leaves should be avoided.

The gathering of leaves should take place during the early hours in the morning as soon as the dew has dried and in the afternoon after the midday heat is over.

During transport the leaves should not be pressed tight in the baskets or sacks, as this will cause fermentation. Worms feeding on such fermented leaves will, undoubtedly, be affected by diseases. If the leaves are collected whilst in a wet state, they should be spread out in layers in a cool room, other than the rearing room, until the moisture evaporates.

It has been observed that the more clean and devoid of moisture the leaves are, the more completely and readily they are eaten by the silkworms. In order to avoid excessive moisture the leaves gathered in the morning should be given to the worms in the afternoon and those gathered in the afternoon, the following morning.

During the first two stages and part of the third silkworms should be fed on leaves from ungrafted mulberry trees which are tenderer and contain less moisture. These leaves should be cut very finely with a sharp knife and given to the worms immediately after cutting.

The leaves should be removed to the rearing room about half an hour prior to their being fed to the worms so that they may acquire the temperature of the rearing house, failing that they may probably affect the stomach of the worms.

During the fourth and fifth stages leaves with small twigs, preferably from grafted and ungrafted trees alternatively, should be given to the worms.

When a steady temperature is maintained in the rearing room, round about 22° C., food should be provided 5–6 times every 24 hours but always at fixed regular intervals; it is always preferable to give less food at more frequent intervals when no wastage will result.

The quantity of food required by the worms cannot be accurately defined; it depends on the race and duration of the life of the worms, as well as temperature of the rearing house. On an average some 800 okes of mulberry leaves would be required to rear 8 drams of silkworm eggs.

In order to avoid uneven rearings, food should be provided simultaneously and in the same proportion to all the worms on the same stall.

Rearers should be particularly careful just prior to and during the moulting stage of the silkworms in feeding the worms so as not to cut the silk thread attached to the leaves whereby they are assisted in the moulting process.

Statement showing the number of mulberry trees of three years old and over during the last five years.

District		Year				
		1929	1930	1931	1932	1933
Nicosia	..	67,519	74,616	76,815	85,014	89,986
Famagusta	..	110,976	118,820	120,930	123,991	125,984
Limassol	..	27,718	30,268	33,512	37,047	38,890
Kyrenia	..	115,272	123,108	128,425	127,616	124,516
Paphos	..	69,779	78,715	82,615	87,297	88,353
Larnaca	..	19,873	24,615	30,343	40,120	45,161
Total	..	411,137	450,472	472,640	501,085	513,890

Agricultural Impressions from a Visit to Italy.

BY P. ANTONIADES, *Viticulturist and Wine Expert.*

DURING my short visit to Italy to participate in the International Meeting of Experts, for the study of the unification of the wine analysis methods, an opportunity was afforded me to see something of the agricultural and particularly viticultural progress of that country.

Vine Dressing.—Italy is a country where vines prosper almost everywhere. Vine culture, as well as all other branches of agriculture, have reached a high standard of intensive cultivation and the ground is fully utilized. The vine throughout Italy is cultivated in association with other cultivations such as: fruit, mulberry and willow trees, cereals, broad beans, beans, potatoes and vegetables. Almost everywhere one meets three floors of cultivation: (*a*) The ground cultivation (with cereals, broad beans, beans, potatoes and vegetables); (*b*) The first floor cultivation (vine); and (*c*) The second floor cultivation (fruit trees, mulberry, etc.). It is, I think, a typical example of intensive cultivation. The cultivation is so intensive that, in passing, one can hardly see a single square yard of uncultivated land. The extension of the cultivation of broad beans is so great that one asks what are they used for; the answer is that the broad bean is the main food of the ground (as green manure), of the people and of the cattle.

Pruning.—The pruning of the vines and trees is so general that one sees no single tree not properly pruned or with a dead or superfluous branch on it. The pruning and the shape in which vines are trained, for the most part on trellis, are very varied, but though the shape and pruning are various the systematical cultivation, pruning, manuring and treatment of vine diseases is general and of a high standard. The use of animal manure or green manure (broad beans, etc.) is general and always completed by the use of superphosphate as fertilizer. The treatments given against fungus diseases or insect pests are not only general but one might say exaggerated; for instance: sulphuring 5–6 times, spraying against Peronospora 5–8 times completed with 2–3 powderings. In the south of Italy the use of anticryptogamic powders (such as Victoria, Ohavi casal Mouferrato, or Cuprosulfol, Marescalhi Casalmouferrato) is general. Spraying is general against Eudemis with calcium arsenite (preferred to lead arsenate) for the two first treatments and sulphate of nicotine for the following treatments. Powdering also with arsenical powders (Merithollo, Maison Scherring, Germany) gives satisfactory results for the first two treatments against Eudemis. But the insecticides more in use, to which the grower is accustomed and gives his preference are those with a basis of nicotine for all aphis and insects. The Italian Government, which has the monopoly of tobacco, has undertaken the preparation of solutions of extract of nicotine and sulphate of nicotine, which are on sale to the public by the "tobacco shops" even in the meanest villages. They are contained in tins of various dimensions with the necessary instructions for use on them.

Vine Support.—One may say that every tree in Italy constitutes a vine support, olive, almond, willow, fig and mulberry, but mainly the mulberry. Vine and mulberry are always associated. An original and economical kind of support which one noticed, a support even for vines on trellising instead of the more costly wire, is the reed cane; this common reed cane constitutes an ideal cheap support for vines when they are young and of their green shoots during their growth period.

Grafting.—The question of grafting on American stocks, though general, the country being infested with Phylloxera, is still under study for the determination of the stocks most suitable for the various districts and the various soils. An original method of grafting of the vine observed is that of grafting not near or a little under the soil as the custom in Cyprus but at one or one and a half foot above ground. This method, though less rapid, presents several advantages and may be of interest in

Cyprus, especially for grafting old vines on trellis. After experiments on this method have been made a description will be given in this Journal, if it proves satisfactory.

Wine Making.—Italy is the richest country in types of wines. Wine making is very well carried out. Modern installations are met everywhere. The use of sulphur dioxide or metabisulphate of potash is general and occasionally exaggerated. The use of sulphur dioxide, selected yeast, and sterilizing filters (Zeiss) added to the high percentage of acidity of the Italian wines, make them keep very well in the hot climate. Not one unsound wine was met with.

Table Grapes.—Table grapes are highly developed in Italy and propaganda is carried out for the extension of their growth and consumption. Festivals of the grape are organized with great ceremony every year and propaganda to increase the consumption of grapes is carried on by the creation of the so-called "Uval Stations." All the well-known table varieties from Madeleine and Chasselas to the latest ones are met. Satisfaction is obtained everywhere with the variety "Regina" which is the same as the well-known "Dattier du Beyruth" and almost the same, if not exactly the same as "Rozaki." This variety has given full satisfaction for its appearance, for the way it can be transported and its high production. For these reasons the planting of this variety should be extended also in Cyprus, since it has been proved to give the same results here.

Particular mention should be made of a visit paid to the Viticultural and Oenological Station of Conegliano, under the kind guidance of its eminent Director, Professor du G. Dalucasso. The Station is an up-to-date establishment for research and experimental work on vine and wine questions, admirably complete and furnished with all the necessary instruments, facilities, laboratories, staff, etc. No instructional or demonstrative work is undertaken by this station, but experiments, research, the collection of documents, statistics, the study of local and imported varieties, observation, etc., which have already been carried on for 3 years will be carried on for a period of 20 years before any conclusions are drawn and published. Close to the Viticultural and Oenological Station, but quite apart as to direction and organization, works the "R. Instituto Tecnico Agrario" specializing in viticulture and oenology, another admirable model of an agricultural institution which, together with the Viticultural Station, prove to the visitor the high level that agricultural science has reached in Italy.

One cannot leave Italy without being deeply impressed with the high standard of the agriculture of the country, in general, and particularly of its viticulture.

Review.

Bates, G. R., "*II. Wastage during the* 1932 *export season.*" *The British South Africa Company Mazoe Citrus Experimental Station. Publication No.* 2, *c.* 1933.

WASTAGE in transit is a problem which affects all growers and shippers of citrus fruit. Information gained from observations and experiments in other parts of the world will be of interest. The above publication is an account of observations on the incidence of wastage of citrus fruit exported from Southern Rhodesia to the United Kingdom during the 1932 season.

Excessive wastage among the early varieties, Jaffa and Mediterranean Sweet, is attributed to adverse weather conditions, when intermittent rain fell during picking. This resulted in the skin of the fruit being more tender than usual and consequently more susceptible of mechanical injury. Normally there is a period of 6 to 8 weeks of dry weather before picking when the skin hardens up. Valencia Late and Du Roi on the other hand, picked during and immediately after an exceptional spell of rainy weather in August, showed no increase whatever in wastage.

Most of the damage was caused by *Penicillium digitatum*, Sacc., which would apparently indicate careless handling. The Jaffa varieties bear fruit in grape like clusters; observations showed that decay commenced from minute bruises caused by forcing the clippers between the closely packed fruits to cut the stems.

As is well known, storage temperature bears an important relation to the rate of decay. Valencia oranges attacked by *Penicillium digitatum* decayed more than three times as rapidly at 70° F. than at 42° F. The important effect of temperature is further shown in the excessive amount of wastage which occurred in consignments shipped through Beira, whereas, consignments shipped through Capetown, arrived overseas in good condition. This is attributed to the fact that fruit shipped *via* Beira is not pre-cooled and remains consequently for some time in the refrigerated hold at a comparatively high temperature before cooling down. During this period considerable wastage would develop.

Experiments were carried out to test the efficacy of various chemical treatments of the fruit on the development of wastage.

Bleaching powder and "Keepos" were of little use in preventing *P. digitatum* decay. Borax gave slightly better control than sodium bicarbonate but both these caused excessive wilting. It is pointed out that this is prevented in the U.S.A.

by coating the fruit with paraffin wax. One per cent. Shirlan NA gave a better control than 3% borax and did not cause wilting. Ammonium carbonate, while giving a good control, caused severe skin blemishes.

The author points out that "disinfection cannot be regarded as a substitute for careful handling," but it may be a valuable additional precaution.

Disinfection and pre-cooling of fruit before shipment would go far to reduce the occasional high percentage of wastage in Cyprus fruit shipped to the United Kingdom. R.M.N.

A Review of the Citrus Season, 1933-34.

PRODUCTION for the year was slightly above average, the yield in the Lefka area recovering from the previous year's frost to a greater degree than had been anticipated.

The beginning of the season saw the inauguration of the Fruit Inspection Service operating under regulations enacted after the passing of the Agricultural Produce (Export) Law, 1933. This service was carried on under the supervision of Mr. M. Papaiacovou and a number of Assistant Inspectors were trained for the work at the various points of export. The work of the Fruit Inspection Service has, on the whole, been carried through with rather less difficulty than had been anticipated, although, not unexpectedly, certain minor adjustments had to be made in the Citrus Fruit Export Regulations during the season.

The necessity for better storage accommodation, especially at the port of Famagusta, has been strongly felt and it is hoped that it will be possible to make better arrangements before the opening of next citrus export season.

As was anticipated, the restrictions of various kinds imposed in the more local markets has had the effect of diverting a greater proportion of the exported crop to the markets of the United Kingdom and of Western, North Western and Central Europe. A very substantial increase in exports to these markets is recorded and there is little doubt that next year will reveal a still further increase, for it is now clear that Egypt is determined to establish her own citrus industry and to make it as difficult as possible for Cyprus citrus fruit to gain ingress to her markets.

The effect of the regulations governing the export of citrus fruit has been to establish a greater confidence in the minds of importers and consumers in the more distant markets by the improved general standard of shipments, graded and packed on the basis of quality. Prices for sound fruit have been

satisfactory throughout the season, and at some times have been definitely good. Towards the end of the season owing to the ripeness of the fruit and the length of time in transit, a number of consignments showed a very high percentage of wastage. A certain percentage of wastage seems inevitable under existing conditions in Cyprus, but as it is well known that wastage bears a strong relation to care in handling, the remedy for lessening the percentage is obvious, viz., by improving the general standard of handling from the tree to the ship in every phase of preparation for shipment. Until conditions of handling are greatly improved both by growers and exporters, wastage especially at the end of the season is certain to occur.

Negotiations for the provision of direct sailings between Cyprus and the United Kingdom were brought to a successful conclusion by the co-operative efforts of some of the more progressive citrus exporters of Famagusta, who jointly and severally guaranteed a substantial minimum freight to the Shipping Companies concerned. This was a step forward for the industry which could hardly have been hoped for a year ago and for which the Association of exporters concerned deserves the greatest credit. It is hoped that this is only the forerunner of greater concerted efforts to come, and that the day is not far distant when co-operative grading and packing under one brand will be established. In this, as in the successful venture mentioned above, the first move must come from the exporters themselves, for no amount of Government encouragement or coercion can make those co-operate who are unwilling to do so.

From figures so far available for the season (9th May) the total number of cases of oranges shipped was 181,531, representing an increase of well over 200% on the 1932–33 season. Of these 92,673 cases went to the United Kingdom, whilst the destinations of the remaining 88,858 cases included Germany, Yugoslavia, Scandinavian ports, Greece, France, Red Sea Ports, Egypt, Finland, Austria, Aden, Colombo and Port Sudan. In addition, considerable quantities of lower grade fruit were shipped in baskets and in bulk to neighbouring countries.

The export of lemons has also increased and according to the "Weekly Fruit Intelligence Notes" of the Imperial Economic Committee, amount to 3,500 cases shipped to United Kingdom. A small number of cases was also shipped to the Red Sea Ports and quantities were also shipped in bulk to nearby countries. There seems no reason why the export of lemons to the United Kingdom should not be increased especially at the beginning and end of the season when prices are nearly always high. The

difficulty is in obtaining the fruit to ship at the right time and for this reason varieties of lemon which bear fruit all the year round (both local and imported types) are now being propagated and placed under trial, for as Cyprus is one of the very few Empire countries shipping lemons to the United Kingdom, hopes are entertained that in the course of time a useful export trade will be built up.

Bitter oranges were shipped to United Kingdom as available for use in the manufacture of Cyprus marmalade and very good prices were obtained. Bitter oranges and sweet limes were also shipped to Palestine presumably for seed purposes.

A small quantity of Sierra Leone and West Indian limes were produced for the first time during the year and consumed locally. There is no prospect of an export trade being developed with this fruit.

The gradually increasing quantity of grapefruit produced is of good quality and during the season under review a small consignment was sent to United Kingdom where a very satisfactory price per case was obtained. Growers have been advised as far as possible to plant the Marsh Seedless variety and its related types as a strong preference exists for seedless grapefruit in all European markets.

Interest in the industry has been more than maintained during the year and there has, in fact, been an unprecedented demand for all types of young citrus trees both by small and large scale planters. This demand has exceeded the supply many times creating an all-round shortage of planting material. Most of the new plantings are being set out on more modern lines, and with the advent of settlers, who have had experience of citrus growing in established citrus-growing countries, it is anticipated that an all-round improvement in methods of citriculture will be achieved.

To sum up, the season just ended has been one in which several important steps have been made in the improvement of the citrus industry. Grading and packing, however, and especially handling of the fruit are by no means all that could be desired; methods of cultivation, irrigation, fertilization, insect pest and disease control are often primitive; and much remains to be done before the industry in Cyprus can be placed on a really sound basis. As was stated in the pages of this Journal last June, "Quality and Uniformity" must be the watch-word, for we must see to it that the creditable position won by Cyprus citrus fruit in the European markets is not lost, but consolidated.

B.J.W.

The following Import Regulations which will come into force in Palestine towards the end of August next are published for general information :—

Palestine Import Regulations.

All plants intended for propagation and which are not included in the schedules to this Order, may be imported if they are accompanied by a certificate signed by an officer of the Phytopathological Service of the country of origin stating them to be apparently free from disease or insect pests. Importation of nursery stock shall only be made through the ports of Jaffa and Haifa, and the Railway Stations at Gaza and Jerusalem.

SCHEDULE I.

The importation of all plants in this schedule is prohibited, provided that the prohibition does not apply to preserved, dried or compressed fruits or to Mango seeds which are the *bona fide* produce of Egypt.

Bananas (*Musa* spp.)

All species of citrus other than citrus fruits from Egypt and Cyprus.

Custard apple (*Anona* spp.)

All species of ficus.

Tomato (*Lycopersicum esculentum*).

Pomegranate (*Punica granatium*).

Cajanus indica.

Guava (*Psidium guava*).

Mulberry (*Morus* spp.)

Palms, including dates and date palms.

Mango (*Magnifera* spp.)

Avocado pear (*Persea* spp.)

Melia azaderacht.

Papaw (*Carica papaya*).

Egg plant (*Solanum melongena*).

Cotton (*Gosypium* spp.) (This does not include ginned cotton.)

All *Hibiscus* spp.

Jasminum spp.

SCHEDULE II.

The importation of plants in this schedule is permitted, provided that they are accompanied by a certificate that they are free from the undermentioned pests or diseases. This certificate must be signed by an officer of the Phytopathological Service of the country of origin.

Vines (*Vitis vinifera*)	Must be certified free from *Phylloxera*.
Citrus fruit from Egypt or Cyprus.	Must be certified free from Red Scale (*Chrysomphalus aurantii*) and Black Scale (*Chrysomphalus ficus*).

All fruit and vegetables from Egypt.	Must be certified free from Black Scale (*Chrysomphalus ficus*) and *Hibiscus* mealy bug (*Phenococcus hirsutus*).
Apples and pears, whether nursery stock or fruit from the U.S.A., Canada, Australia or Hungary.	Must be certified free from San Jose Scale (*Aspidiotus perniciosus*).
Maize seed.	Must be certified free from *Sclerospora graminicola*.
Bean Seed.	Must be certified free from *Collectrichum lindemuthianum*.
Potato seed.	Must be certified free from *Synchytrium endobioticum*, *Bacillus phytophthorus*, *Spongospora subterranea*, *Phthorimæa operculella*, *Leptinotarsa decimlineata*.
Cabbage Seed or Cauliflower Seed.	Must be certified free from *Pseudomonas campestris*.
Rose, Apple, Quince and Pear nursery stock.	Must be certified free from Crown gall (*Bacterium tumefaciens*).
Fresh cherries.	Must be certified free from *Rhagoletis cerasi*.
Fresh peaches.	Must be certified free from *Clasterosporium carpophyllum*.
Citrus nursery stock and bud wood.	Must be certified free from *Pseudomonas citri* and *Sphaceloma fawcettii*.
Mango.	Must be certified free from *Bacillus mangiferæ*, *Chrysomphalus ficus*, *Chrysomphalus personatus*, *Phenococcus mangiferæ*. All species of *Trypetidæ*.
Potatoes.	Must be certified free from *Phthorimæa operculella*, *Leptinotarsa decimlineata*.
Carobs.	Must be certified free from *Chrysomphalus ficus*, *Chrysomphalus personatus*.
Ficus spp.	Must be certified free from *Chrysomphalus ficus*, *Chrysomphalus personatus*.

AGRICULTURAL CALENDAR.

JULY TO SEPTEMBER.

WORK ON THE FARM AND IN THE GARDEN, VINEYARD AND APIARY.

July.

Farm Crops.—Harvesting of cereals is completed and threshing is in full swing. If opportunity occurs to thresh by the power threshers, farmers are strongly advised to do so in preference to the long and tedious method by the primitive threshing board. By speeding up the threshing operations, the grain will be protected from exposure to climate, adulteration and insect pests. All grain stores should be cleaned and disinfected before the new grain is placed in store.

Selection of seed corn should be carefully done.

Potatoes may now be planted; in selecting seed for the Autumn crop, care should be taken that only seed from a crop that has been inspected in the field and is known to be free from virus diseases and other seed-borne diseases such as Black Leg and the *Fusarium* Wilt, should be used.

As a prevention of Scab and of other diseases carried on the tuber, seed may be disinfected with a solution of $1-1\frac{1}{4}\%$ copper sulphate—or by steeping the tubers for three hours in a weak solution of commercial formalin. (100 drams to 60 okes of water).

This is the best month for retting flax.

Before placing the flax straw into the retting pool, the straw should be graded according to length thickness and degree of maturity. An admixture of immature green straw with fully mature yellow straw lowers the value of the fibre. Land should be ploughed now if not already done for next year's crop.

Cotton and other Summer crops should be regularly hoed and irrigated.

Live Stock.—During the hot summer months the incidence of Anthrax is at its highest. Particular attention should, therefore, be paid to the proper burial of the carcases of all animals which have died from disease.

Any sudden deaths which occur should of course be reported to the Veterinary Office at once, in order that spread of the disease may be prevented.

The application of tar or a mixture of tar and oil to the nostrils of sheep as a preventive against attack by œstrus fly should be continued, as should the periodical dipping of flocks.

Poultry.—See and follow Calendar for June.

Fruit Garden.—Continue measures against insect pests as in June.

All apple, pear, plum, peach, quince and walnut trees must have a bandage of cloth or straw placed round the branches above the first branching before 15th July. This bandage should be removed and burned before the limewashing of the trees next February and it is desirable that while fruit remains on the tree, the bandage should be removed at least every ten days and all insects found in it killed by burning the bandage or dipping it into boiling water and returning it to the tree.

Vineyard.—Third sulphuring against Oidium. Third spraying against "Peronospora." Third spraying or dusting against Eudemis. Weeding. Grape gathering may commence at the end of the month in some localities.

Vegetable Garden.—Sow parsley, broccoli and turnips. Prepare seed beds for lettuce. Transplant leek and celery. Continue dusting melons, cucumbers and other cucurbits with sulphur against the powdery mildew.

Flower Garden.—Weeding, light hoeing and watering are important. Chrysanthemums and other plants suffering from aphis attacks should be sprayed.

Apiary.—See and follow Calendar for June.

August.

Farm Crops.—Threshing is coming to an end. The precautionary measures recommended in July Calendar for the storage of grain and selection of seed should be borne in mind. Planting of potatoes should be finished this month and irrigation of newly-planted fields should be made twice a week until the young sprouts are well advanced.

Cotton is now nearing maturity and in early planted fields picking may be started. During the picking of cotton great care should be taken not to mix dry leaves, etc., with the seed cotton or the quality and the market value of the cotton will be lowered.

Remove all cobs of maize seen to be affected with the maize smut, before the enclosing membrane has burst and thus prevent the spread of the spores.

Retting may be continued, but precautions must be taken in case of sudden rises in temperature, which may occur. The inflow of fresh water to the retting pool must be regulated accordingly, and the duration of the ret shortened. Wherever possible, the flax should be taken out of the ret and put in an upright position, in lines, say four feet apart. As soon as the

water has run off, the bundles should be laid flat and opened up. By this method, drying will not take more than 2 days for the whole operation, namely taking out, drying and re-bundling. The flax will become uniform in colour and very slightly bleached.

Preparation of flax fields for next sowing season continues. Stable manure should now be ploughed in, and frequent harrowing must follow to obtain a nice tilth with the manure well distributed.

Live Stock.—Continue the regular dipping of sheep and goats for destruction of ticks and lice. Flocks should also be dosed with copper sulphate at intervals of three or four weeks. Large flocks should be divided into two, three or four lots to prevent overcrowding and contamination of the pastures. Do not water the flocks from pools of standing water if wells are available. To prevent spread of disease, see that all carcases of animals are properly buried.

Outbreaks of poultry disease can be checked by the isolation of sick fowls, the cleaning and disinfection of the premises, and the burning of dead fowls.

Fruit Garden.—Periodical irrigations, especially in citrus groves, should be given. Weeds should be rigorously controlled and hoeing should not be neglected if it is desired to preserve the soil moisture.

Continue measures against insect pests as in July.

Vineyard.—Grape gathering continues in the lower areas. Early vintage begins about the second half of the month. Raisin making commences.

Remove the wild shoots and roots from grafted stems. Leave the grafted vines uncovered.

Prepare and clean the wine stores and wine vessels in readiness for wine making.

Vegetable Garden.—Sow beets and early lettuce for transplanting. Also spinach, broad beans and haricot beans may be sown. Irrigations, hoeings and weedings should be carefully done. Cucumbers may be sown for a very late crop. Continue control measures against insect pests and diseases.

If the celery seedling beds are attacked by the Celery Blight, *Septoria apii*, spray with Bordeaux Mixture before transplanting.

Flower Garden.—Winter flower seeds may be sown for transplanting later on. Chrysanthemums require special attention.

Continue control measures against insect pests and diseases.

Apiary.—See and follow Calendar for June and July. Take precautions for protecting against hornets.

September.

Farm Crops.—See that the agricultural implements are ready for the Autumn cultivation; plough, level and harrow fields for cereals and pulse crops. Harvest maize, sorghums, beans, etc. In some parts dry sowing of barley begins, also oats, rye, lucerne and vicos. Seed corn dressing is recommended and farmers should see that their seed corn is free from weed seeds before sowing. Pickle grain intended for sowing in a solution of formalin (strength 25 drams to 20 okes of water or 1 tablespoonful to 3½ okes). Moisten the grain in a heap on the floor and see that all the grain is thoroughly wetted. Cover the heaps with sacks soaked in the solution for four hours and spread out to dry before sowing.

This is the last month when retting of flax may be undertaken. The difference in temperature at day and night is considerable and does not favour uniform retting. Extra care must be taken to dry the straw, as quickly as possible after it has been taken out of the pool, and to this end it is best spread in thin layers on the ground. Preparation of the flax fields for the next sowing continues. Stable manure or any other organic manure should now be ploughed in, if this has not already been done, and frequent harrowings are beneficial. Seed should be carefully cleaned and winnowed to ensure that only the best is used for sowing.

Live Stock.—Increase the dry food ration, but where possible give also cabbage leaves, mangolds, lucerne, etc. Pasture now being scarce, give sheep straw, bran, etc. Commence fattening pigs; they should have barley or maize meal, also pumpkins, roots, mangolds, potatoes, etc.; they should not be allowed to roam. Castrate pigs 2 to 3 months old. Keep pigstyes clean.

All of the health recommendations for August should be continued during this month. It is now of special importance to dose sheep and goats with copper sulphate solution. Remember that the first effect of the early rains is to cause an increase in parasitic worms which have been accumulating in the soil during the dry season. To enable flocks to withstand this heavy degree of infection, they should be given some additional food, such as ground barley, linseed cake or cotton cake, straw and lucerne or silage, if available.

The cost of hand feeding the flocks at this time, until sufficient pasture is available, will be amply repaid.

Poultry.—Continue to fatten poultry, turkeys, etc. Keep them shut up, as, if allowed to run about, they will not fatten Keep the poultry yard and house clean. For fattening, maize or barley meal mixed with water or skimmed or pure milk is good; grass is wholesome. Fowl cholera usually begins to be

prevalent at this time. All fowls which are drooping and unhealthy should be either killed or isolated. Dead birds should be carefully burnt. Drinking vessels should be washed out every day.

Fruit Garden.—Begin grafting with dormant buds; remove dressings of previous buddings. Prepare ground for autumn and winter planting and when digging the holes for the young trees, bear in mind that the majority of fruit trees in Cyprus are planted far too close. 20 feet apart is a safe average for most fruit species, though if in any doubt for special kinds of fruit, an enquiry to the Department of Agriculture may save a lot of trouble in after years. All almonds must be gathered before the end of this month and all fallen almonds should be picked up from the ground. Diseased almonds should be destroyed or buried so that they are covered by at least one foot of soil, to destroy the pest, *Eurytoma.* Fly traps for *Ceratitis* should now be hung in fig trees, as the fruit becomes ripe. All fallen fruit should be buried daily to prevent the flies breeding in it. Care in carrying out control measures against *Ceratitis* in summer fruits will reduce the attack on citrus fruits in the winter.

Vegetable Garden.—Sow lettuces for winter production, beetroot, spinach, radish and parsley. Plant out onions for spring consumption. Earth up celery and spray a second time with Bordeaux mixture, if attacked by the celery blight disease.

Flower Garden.—Separate perennial plants which should bloom in spring and summer. Remove carefully the old stems. Continue to plant bulbs. Finish repotting of plants. The seeds of those perennial plants should be sown, which require to be sown immediately after collection of those which take a long time to germinate. The following are recommended for sowing this month :—

Clarkia, devil-in-a-bush, marigold, candytuft, gaillardia, stocks, forget-me-not, mesembrianthemums, mignonette, violet, collinsia, phlox, antirrhinum, snap dragon, verbena.

Vineyard.—Wine making starts and becomes general. Raisin making continues. The use of Potassium metabisulphite in wine making should be more general; rate, 10 drams per load of wine or 3 to 4 drams per load of grapes, at the time of crushing.

Apiary.—Collection of the surplus honey should be commenced and combs, which are well filled with honey and as free from "brood" as possible, should be removed. Apply very little smoke whilst this operation is in progress, as the honey may absorb it and the pleasant aroma of the product be spoilt. Shake the bees off the comb on to the alighting board and brush the comb with a turkey's feather to remove those still clinging to the surface. Care should be taken to see that the queen is not on the comb when this operation is being carried out.

After removal from the hives, the combs should be carried to the extracting room and placed ready to go through the extractor, which should be operated in a dry, well ventilated and bee-proof room. The empty combs should be returned to the bees just before night-fall, and not even a small amount of sweet material should be left exposed, as robbing once started at this period, will become serious. The honey should be passed through a strainer as it flows from the extractor, and should be placed in clean, moisture and dust-proof vessels.

Note should be taken of hives headed by old queens and hives which yielded honey much below average. When extracting is over and quietness prevails once more these may be re-queened by introducing young queens. If desired, hives may now be removed short distances to new locations, without loss of bees, but this should be done at night-time. A slanting board placed in front of the entrance for a few days, will enable the bees to note the change whilst flying out.

All honey should be carefully canned or bottled for market, special precautions being taken to ensure cleanliness, and packed in as attractive a manner as possible.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.
MARCH, 1934.

District and Station	Shade temperature Mean Maxm	Minm	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District							
Nicosia	69.32	45.52	0.49	6	0.18	0.86	
Athalassa		—	0.34	2	0.20	1.03	—
Morphou	70.8	43	0.40	3	0.15	0.85	
Makheras			0.90	2	0.50	2.70	
Famagusta District .							
Famagusta	70.32	46.13	0.21	1	0.06	1.09	
Akhyritou	68.8	41.9	0.25	5	0.08	1.25	
Rizokarpaso ..		—	1.07	4	0.60	1.58	
Lefkoniko			0.56	5	0.30	0.93	
Larnaca District .							
Larnaca	70.3	48.5	1.13	6	0.47	1.15	
Lefkara			2.19	7	0.60	1.63	—
Limassol District .							
Limassol	69.71	46.87	1.13	6	0.47	1.40	
Saittas			2.16	7	0.53	3.14	—
Trikoukkia... ...			3.46	8	1.08	3.47	
Alekhtora			1.40	7	0.60	1.46	
Paphos District :							
Paphos	75.42	43.97	1.37	5	0.71	1.66	
Polis...			1.28	4	0.38	1.61	
Kyrenia District :							
Kyrenia	72.58	53.13	0.34	3	0.19	1.28	—

Note.—Compiled from returns taken by Public Works Department.

APRIL, 1934.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District							
Nicosia .. .	78.5	51.53	0.27	2	0.23	0.53	
Athalassa ..			0.37	2	0.26	1.04	
Morphou ..	76.5	49.23	0.47	3	0.27	0.83	
Makheras						1.85	
Famagusta District.							
Famagusta .	76.5	50.16	0.10	2	0.30	0.70	
Akhyritou	76.00	51.1	0.30	3	0.18	0.60	
Rizokarpaso			0.26	2	0.15	0.71	
Lefkoniko			0.11	2	0.24	0.84	
Larnaca District							
Larnaca ...	78.4	51.9	0.20	1	0.20	0.99	
Lefkara			0.28	2	0.20	1.04	
Limassol District.							
Limassol . ..	75.33	50.17	0.19	2	0.16	0.91	
Saittas			0.70	2	0.50	1.87	
Trikoukkia		–	1.08	4	0.58	2.48	
Alekhtora .. .			0.52	2	0.28	1.34	
Paphos District:							
Paphos .. .	73.4	48.2	0.50	4	0.25	1.09	
Polis			0.42	3	0.22	0.99	
Kyrenia District							
Kyrenia .. .	77.5	56.56	0.18	2	0.41	0.71	

MAY, 1931.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District							
Nicosia .	83	58.55	0.92	6	0.51	0.86	
Athalassa .			1.57	3	0.80	0.32	
Morphou	78.90	54.25	0.50	1	0.32	0.32	
Makheras	–		0.75	1	0.75	0.79	
Famagusta District:							
Famagusta	81.60	58.16	0.75	3	0.60	0.46	
Akhyritou	82.2	58.5	0.53	4	0.22	0.79	
Rizokarpaso .			1.42	3	1.12	0.65	
Lefkoniko			2.38	5	1.20	0.68	
Larnaca District.							
Larnaca	85.8	60	0.49	5	0.30	0.36	
Lefkara			0.61	4	0.39	0.58	
Limassol District.							
Limassol .. .	80.90	58.32	0.47	6	0.12	0.33	
Saittas			1.63	6	0.60	1.33	
Trikoukkia	–		3.35	5	1.06	0.94	
Alekhtora . .			1.71	3	0.63	0.23	
Paphos District:							
Paphos	75.87	64	1.25	5	0.75	0.38	
Polis.	–		2.05	4	1.45	0.21	
Kyrenia District.							
Kyrenia	81.6	62.10	2.73	5	2.22	0.32	

Note.—Compiled from returns taken by Public Works Department.

EDITORIAL AND ADVERTISEMENT NOTICES.

All communications for publication should be addressed to the Editor *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

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Annual subscription payable in advance 16*cp.* post free. Overseas subscription 18*cp.* (2/-).

SCALE OF ADVERTISEMENT CHARGES.

A uniform reduced rate is charged for all advertisements which covers their insertion in the English, Greek and Turkish issues respectively.

As special efforts are being made to increase the circulation of the Journal in the Colony and Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force.—

COVER—Full page, 1 year or 4 insertions ...	£2	15	0
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,, Half page ,,	1	4	0
,, Quarter page ,,	–	12	0

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All charges payable in advance.

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For Wants, Articles for Sale or Exchange, Notices of Meetings, Events, etc., for the first 16 words, 2*s*. Exceeding 16 words but not exceeding 32 words, 4*s*. For every additional 8 words 6*cp.*

These charges include insertion in the English, Greek and Turkish issues.

Advertisements should be written on one side of the paper only, and should reach the Editor, *Cyprus Agricultural Journal*, not later than the 10th of the month of issue.

The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

List showing where Government Animals are stationed as from the 1st June, 1934.

STALLIONS.

Name.	*Station.*
WATERKOSCIE	Lefkoniko.
MOLESKIN	Athalassa.
PITCHFORD	Larnaca.
MAZARIN	Famagusta.
CORBY BRIDGE	Athalassa.
CANTERBURY	Paphos.
LIFE LINE	Ayios Theodhoros
LLWYNOG'S MODEL	Polis.
MARCHER LORD	Vatili.
FRIARS FLUTTER	Limassol.

DONKEYS.

No. 42	Athalassa.
,, 38	Famagusta.
,, 39	Athalassa.
,, 41	Paphos.
,, 45	Polis.
,, 47	Rizokarpaso.
,, 48	Vatili.
,, 49	Limassol.
,, 50	Ayios Theodhoros.
,, 51	Athalassa.
,, 52	Larnaca.
,, 53	Yialousa.
,, 54	Lefkoniko.

BULLS.

No. 85/374	Half Bred	Athalassa.
,, 133/422	Dutch Bull	do.
,, 135/424	Half Bred	Vatili.
,, 137/426	Native	Polemi (on loan).
,, 139/428	Ayrshire	Athalassa.
,, 141/430	Half Bred	Yialousa.
,, 144/433	do.	Limassol.
,, 147/436	Native	Nata (on loan).
,, 150/439	do	Famagusta.
,, 152/441	Half Bred	Larnaca.
,, 154/443	Native	Lefkoniko.
,, 165/454	do.	Rizokarpaso.
,, 1/451	Kerry Bull	Athalassa.
,, 453	do.	Paphos.
,, 456	Native	Ayios Theodhoros.
,, 457	do.	Athalassa.
,, 446	Half Bred	Agricultural Dept., Nicosia.
,, 448	do.	Athalassa.
,, 458	Native	do.
,, 459	do.	Polis.
,, 450	Half Bred	Armenian Orphanage (on loan)

BOARS ON LOAN.

	Village.	Owner.
No. 83	Amarghetti	Dimitris Michael.
,, 98	Kathikas	Dionyssios N. Nicolaides.
,, 97	Letimbou	Costas Ch. Papagalou.
,, 91	Yiolou	Sofoclis Petraki.
,, 81	Ayios Photios	Harilaos Nicola.
,, 80	Nata	Arestis Yianni.
,, 87	Episkopi	Lambis Charalambou.
,, 78	Lyso	Argiros Ph. Kokkinos.
,, 79	Polemi	George Theophanides.
,, 76	Avgasidha	Loizos Hj. Anastassi.

HE-GOATS.

	Station.
No. 141	Rizokarpaso.
,, 143	Polis.
,, 146	Athalassa.
,, 149	Paphos.
,, 150	Evdhimou (on loan).
,, 155	Vassa do.
,, 140	Anoyira do.
,, 157	Agricultural Dept., Nicosia.
,, 189	Kouklia (on loan).
,, 176	Trimithousa (on loan).
,, 164	Limasssol.
,, 177	Yialousa.
,, 179	Rizokarpaso.
,, 180	Ayios Theodhoros.
,, 170	Limassol.
,, 194	Ayios Theodhoros (on loan).
,, 174	Avgasidha (on loan).
,, 169	Pakhna (on loan).

SHE-GOATS.

No. 64	Yialousa.
,, 70	Famagusta.
,, 71	do.
,, 74	Limassol.
,, 77	Stavros Psokas (on loan).
,, 78	Paphos.
,, 118	Rizokarpaso.
,, 101	do.

BOARS IN DISTRICT STUD STABLES.

No. 105	Polis.
,, 100	Paphos.
,, 95	Famagusta.
,, 93	Rizokarpaso.
,, 92	do.
,, 89	Limassol.
,, 88	Larnaca.
,, 82	Ayios Theodhoros.
,, 84	Athalassa.
,, 77	do.
,, 75	Paphos.
,, 74	do.
,, 73	do.

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Grape Gatherin

The
Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXIX, Part 3 SEPTEMBER, 1934 Price 3cp.

EDITORIAL NOTES.

WEATHER conditions during the past three months have been generally favourable. Temperatures were comparatively high, particularly in July and the early part of August, but fell in the second half of that month. As the result of previous dry years underground water supplies are seriously diminished and in spite of the rainfall in the early months of the year are frequently less than at the same period in 1933, as a consequence there has been some reduction in the area planted with summer crops.

* * * * * *

A satisfactory cereal harvest has been secured and the quality of wheat and barley is generally good. Owing to pressure by farmers to sell as soon as wheat was threshed prices were forced down to three shillings and under per kilé in spite of the duty on imported flour having been raised to £3 per ton. Recently, however, surpluses have been absorbed and prices have risen to nearly four shillings per kilé, and, as a result of sales for export, barley prices have also risen considerably.

Winter potatoes produced a satisfactory crop, most of which was sold at fair prices. Tuber moth made its appearance as usual as the weather became warmer. The area sown to the summer crop is estimated to be 20% less than last year owing to shortage of water for irrigation.

For similar reasons the cotton crop will not be large but where it has not been affected by drought or hot winds quality is expected to be good.

The carob crop is below normal, demand has been good and a large proportion of it has already been sold at from 15*s*. to 18*s*. per cantar.

The citrus crop is expected to be about 25% below that of last year but some of this shortage will be made good by new groves coming into bearing.

* * * * * *

The Agricultural Department in particular and the stock industry in general will regret the retirement on 11th September of Mr. Geoffrey Barrett, who has been for over 30 years in charge of the Athalassa Stock Farm. This farm was started in 1902 and has been developed entirely by Mr. Barrett. To his work there and throughout the Island must be assigned a great part of the improvement in the Island's Stock of all kinds that has taken place within the past 30 years. Mr. Barrett is settling at Famagusta and the best wishes of his numerous friends within and outside the Department go with him in his retirement.

* * * * * *

Mr. H. Davidson, the Mechanic in charge of Threshing Machinery, left the Department on 15th September, 1934, on the expiration of his agreement.

* * * * * *

Three successful Agricultural Shows have been held: at Dherinia on 15th, 16th and 17th July, at Lysi on 8th September and at Polis on 23rd, 24th and 25th September. Others projected during this year are at Yialousa for tobacco and broom corn on 28th October and at Kyrenia and Morphou later in the season.

* * * * * *

The import duties charged on silk entering the United Kingdom were reduced as from the beginning of July last by 1*s.* 6*d.* per ℔. and are now 1*s.* 6*d.* per ℔. on foreign raw silk and 1*s.* on silk of Empire origin. In spite of this concession, however, the prospects of effecting sales of Cyprus silk at profitable prices are but meagre, owing to the extremely low prices at which Japanese silk is being marketed. It is regrettable that these low prices for silk rendered it impossible for the Filature to offer an attractive price for cocoons and the factory has remained closed this season.

* * * * * *

An outbreak of Mussel scale (*Lepidosaphes beckii*) on citrus in groves in the town of Limassol was discovered in June. Fumigation of all trees in the infested area was promptly undertaken by the Agricultural Department and the pest has been checked. It is hoped that it has been eradicated, but this cannot yet be definitely stated. It is probable that this scale was introduced on fruit entering the port in passengers' baggage and so escaping inspection.

In the last issue of the "Agricultural Journal" attention was drawn to the sudden appearance of the severe pest of flax known as Dodder or Cuscuta. Recently a similar but distinct species of this parasitic plant has been found attacking tobacco, particularly in the seed beds. The disease has not been observed before and appears, therefore, to be a recent introduction. By a concerted effort on the part of all growers it should be possible to eradicate permanently this pest.

The attacked tobacco plants are easily recognized in the field by the masses of very fine yellowish-pink vegetative threads which twine around the stems and leaves of the tobacco plant becoming in some instances thickly matted. On closer observation it will be seen that these threads, which are the stems of the Dodder, have penetrated the tobacco host plant at many points and have no direct connection with the soil.

In general appearance, habit and effect this parasitic plant is very similar to the flax Dodder and the same measures may be taken to control it. All tobacco seed beds should be carefully inspected and any diseased plants dug up and burnt. If badly affected the whole bed should be covered with straw or chaff, soaked in kerosene and fired. It is particularly important that no seedlings affected by the pest or with portions of it adhering to them should be transplanted, as by so doing the Dodder may become established in the field and eventually spread throughout the locality.

* * * * * *

The vine harvest is not quite realizing the promise of earlier months but it is expected that the crop will be no less than last year. In several districts drought has caused some diminution of the crop and during July and early August sunburn has been responsible for considerable damage, particularly in valleys where the vines and grapes are less hardy and where growth is more luxuriant than on the hills. In some individual vineyards losses from this cause have been as high as 25 % but over the whole of the vine areas it is estimated that not more than a 5 % reduction of crop will result for this cause. Oidium appeared early and caused damage where vines were unprotected but rapidly disappeared before the summer heat. There has been no appearance of Peronospora.

Some damage was caused by Eudemis, particularly in the lower areas, but where spraying was carried out the damage was negligable. With the exception of the results of drought and sunburn all other losses were of a preventable nature and growers should remember that, because for climatic or other

reasons a pest or disease does not appear in any one season, that is no good reason to neglect measures against such pests or diseases the next year. A succession of dry years since 1931 has greatly reduced the attacks of fungus diseases of all plants but in years of more generous rainfall the risk of Peronospora and other diseases will be no less than in the past and unless proper precautions are taken losses may be considerable.

The ripening of grapes is considerably earlier than last year. Raisin making commenced on 18th August and wine making during the first week of September.

* * * * * *

There has been a very satisfactory increase in the number of sheep-dipping baths in the Colony. There are now 28 baths of which five are in Nicosia District, fifteen in Famagusta, five in Larnaca, two in Paphos and one in Limassol. Seven of these baths have been provided at Government expense for demonstration purposes, eight are owned by individual flock-owners and thirteen are communal property, the cost having been provided either from Village Public Health Funds, surplus Village Road Funds, or by co-operative subscriptions of flock-owners.

* * * * * *

The vaccination of sheep and goats against Anthrax (Phlangara) continues to give gratifying results. During April, May and June of this year over 480,000 animals were vaccinated by the veterinary staff. Outbreaks of the disease during July and August, in which months the mortality has usually been most severe, have been very rare. The protection afforded to goats is not so strong as in the case of sheep, and it is regrettable that in some areas goats which died of Anthrax have been left unburied thereby spreading the disease to other stock.

* * * * * *

With a view to producing cattle of a better and more quickly maturing type for export, a Devon Shorthorn bull has been stationed at Vatili Stud Stables.

Wood Preservation.

BY F. S. DANKS, *Asst. Conservator of Forests, Utilization Officer.*

INTRODUCTORY.

THIS is a subject which has been receiving considerable attention recently, in view of the threatening timber famine. Very little has been done in Cyprus to encourage the preservation of wood ; this is all the more remarkable when one considers the lack of trees in the Near East. The object of this article is to enumerate briefly some of the methods used to render timber more durable, under many varying conditions.

2. The chief enemies of timber are fungi and insects, and these can damage timber under favourable conditions only, such as temperature, moisture, etc. Since man cannot control the elements, it is necessary for him to devise some method or methods for making timber immune to deterioration. Timber which has been well seasoned and is used for interior building construction, furniture, fittings, etc., and where the changes in temperature and relative humidity are not considerable, need not receive any preservative treatment, if precautionary measures have been taken to prevent insect or fungi attack during felling, sawing, seasoning, and manufacture also. Nearly all modern interior work is treated with polish, paints, varnishes, etc., which are in themselves anticeptics.

3. Decay is the greatest bugbear in all forms of converted timber, and yet at the same time it may be considered as one of the greatest assets to the forester. This may sound paradoxical, but if we did not have decay in the Forest we should have to go to considerable expense in clearing up rotten trees, branches, bark, and all the waste from felled trees. This decomposed material goes to form what is generally known as humus. Insects, fungi and certain forms of bacteria are responsible for the decomposition.

4. The wood substance, or tissue, is the food supply of these insects and deleterious fungi. Prevention of attack means that some method must be adopted which will render the wood impalatable to insects and fungi. Hence, to put it briefly, wood preservatives are insect and fungal poisons.

5. It has been said that certain types of oil preservatives render wood inflammable, but such preservatives are usually used for Marine and outdoor work, and even should it be necessary to use such material for house construction, there are several methods whereby the wood can be rendered non-inflammable.

ELEMENTARY WOOD PRESERVATIVE METHODS.

6. I propose to discuss several methods of Wood Preservation which might be of use in Cyprus. In each case I have considered the question of economy in cost of preservative and apparatus,

or equipment, for carrying out the treatment. I do not propose to refer to any of the more advanced methods of pressure and vacuum impregnation treatment, where the machinery is much too complicated for any Cypriot engineer. Technicalities have been avoided, wherever possible.

CHARRING.

7. This is probably the oldest method of protecting timber from decay. It is still commonly used in Cyprus. It is very probable that the primitive man knew of it when he hardened the point of his wooden spear in the fire. Certainly Lake Dwellers knew the preservative value of charring wood. Briefly the process consists in holding the wood to be treated over a fire until the outer fibres are charred. This means that the outer layers of the wood are charcoal which is not attacked by fungi or insects. The depth of charring is usually $\frac{1}{8}''$ to $\frac{1}{2}''$. The inner layers are thus protected from any injury.

8. The result of rapid charring with unseasoned timber is that case-hardening occurs. Contraction of the outer layers and the increased pressure of steam and moisture in the inner layers brings about a state of considerable tension between the outer and inner layers, with the obvious result that the charred part splits and cracks so badly, that it is generally known as "starring" professionally. The writer has seen Eucalyptus Telephone Poles treated in this way, which have split in half for a distance of more than 2 feet up from the butt. It is fairly obvious that the area thus exposed to attack is considerably increased. Unfortunately the charring process in Cyprus is carried out much too rapidly and with unseasoned wood.

9. There is a secondary reaction caused by the charring of the outer layers. Destructive distillation is set up where the heat is sufficiently high, *i.e.*, in the neighbourhood of the charred areas. This pyroliqueous acid so formed is in itself a fairly powerful preservative agent and is extremely toxic to fungi.

10. The process of charring is not to be recommended unless as a last desperate resource, and even then it should only be used on thoroughly seasoned timber, and the process should be carried out slowly.

BRUSH TREATMENT.

11. This form of treatment is probably used more extensively than any other superficial method. As the name suggests, it consists in merely applying the preservative to the surface of the wood by means of a brush. As is always the case in superficial treatment, the best results can only be obtained when the wood is thoroughly seasoned. Preservatives have always better powers

of penetration into dry woods. When using "oil" preservatives it is definitely advantageous to heat certain of them to say 180° to 200° F., *e.g.*, Creosote. Even under favourable circumstances it will be found that the preservative rarely penetrates more than ¼ of an inch.

12. It is very essential that special care be taken in working the preservative into all checks, cracks, joints, etc., as thoroughly as possible. Paints, varnishes, enamels, etc., can all be considered as preservatives under brush treatment, either for indoor or outdoor wood work.

13. The Cyprus Railways use sleepers, imported from abroad which have been subjected to pressure treatment with creosote as the usual preservative. Even then the General Manager, Railway, find it profitable to recondition certain of these sleepers in order to prolong their utility. The General Manager, Railway, has kindly granted me permission to quote the following figures :—

1 40-gal. Barrel of Bitumen Solution costs 30*s*.

This amount of solution is sufficient to paint between 850–900 sleepers.

1 labourer on a salary of 15*cp.* per day can paint 50–55 sleepers per day.

Cost of Brush is 1*s.* 4½*cp.*

Size of sleepers, 5′ × 6″ × 4″.

Costs work out as follows :—

	£	*s.*	*cp.*
Bitumen solution	1	10	0
Brush	–	1	4½
Labour (17 men @ 15*cp.* per day) 850 sleepers	1	8	3
	£2	19	7½

Allow £3 for treating 850 sleepers. Then actual cost per sleeper works out at 26 *paras*.

DIPPING OR SIMPLE IMMERSION PROCESSES.

14. There is always a certain amount (in some cases a considerable amount) of difficulty in working the preservative into checks, cracks, etc., and so one finds that dipping is more effective than the brush method. In dipping it is necessary to have some tank or container large enough to hold the preservative and allow the material selected for treatment to be submerged. In many instances it is not necessary to submerge the whole piece of timber, *e.g.*, Fencing Posts, Gate Posts, Telephone Poles, etc. In such instances it is only necessary to treat that part which comes into intimate contact with the ground.

15. Dipping is safer and surer than brush treatment and in general yields much better results. Dipping is a non-pressure process and relies on the absorbtive properties of the wood to secure successful penetration; no doubt atmospheric pressure helps to some extent in forcing the preservative into the wood. The apparatus may consist of any open vessel, such as a vat, barrel, tank, cylindrical metal retort, etc.

16. There are many different methods and processes which may come under the heading of dipping for the purposes of this brief article, although they are not considered as such from a technical point of view. I propose to enumerate a few of the more important in common usage in various countries. Some of them are imminently suitable for Cyprus conditions. It may even be found that two methods may be employed together.

17. *Kyanizing Process.*—The timber is steeped in a solution of Perchloride of Mercury (Mercuric chloride or Corrosi ve sublimate) at atmospheric temperature and pressure. The wood is built up in the tank much in the same way as is done in seasoning, *i.e.*, stickers or lathes are placed between each layer of timber, and a space is left between each piece in the layer. The reason for this is to allow of a free circulation of the solution. The strength of the solution is usually 1 %.

18. The length of time the timber must be kept submerged is variable as it principally depends on the thickness of the material to be treated. A rough estimate would be to allow one day for every inch of thickness, plus an extra day, *e.g.*, a 2″ plank would steep for 2 days plus the day extra, making 3 days in all.

19. Needless to say, Corrosive Sublimate is an extremely dangerous poison, therefore it is imperative that it be handled with the utmost caution. It is always advisable to have a container near the tank from which the solution can be pumped into the tank, and at the completion of the treatment it can be withdrawn and pumped back into the container.

20. *Open Tank Process.*—The plan or apparatus consists of a tank or container of any size convenient to the dimensions and quantity of timber to be treated at any one time. The container or tank must be so constructed that it may be heated directly by a fire under the tank or preferably by steam coils passing through the liquid at the bottom of the tank. A suitable storage tank should be adjacent, fitted with a pump so that the preservative may be pumped into or out of the tank.

21. The timber is placed in the tank and arranged as previously described. The creosote (or other preservative) is then admitted until it covers the timber to a depth of say 4″–6″ (allowance must always be made for the expansion of oils). The steam coils

are then heated until the temperature of the creosote reaches 200° F. in the tank. This temperature is maintained for one hour and then allowed to cool down ; care must be taken to keep the timber well covered. Although the usual time allowed to cool down is about 24 hours, this need not be adhered to very strictly, but may vary with the needs or requirements of the operator. The lower the temperature to which the preservative is allowed to cool, the greater will be the absorption.

22. If the wood is seasoned (as it should be) it contains minute air spaces ; thus when the wood is heated the air expands and a certain amount is driven out as air bubbles which, with certain timbers, cause a thick froth on the surface of the creosote. On cooling, a partial vacuum is set up owing to the contraction of the air left in the timber and so the preservative is drawn into the tissues of the timber. This process works very well with sleepers, fencing posts, telegraph poles, and for general farm work.

23. *Powellizing.*—In this process the apparatus is similar to the "Open Tank Process."

24. The preservative in this case is a saccharine solution, frequently containing an admixture of arsenic. Time taken depends on size and species of timber, and may vary from a few days to 3 or 4 weeks. The saccharine solution coils at a slightly higher temperature than water, therefore the water in the wood escapes as steam. Owing to the slight difference in temperature, the action of converting the wood moisture into steam is not so violent as it would be with creosote at 200° F. The wood fibres are not badly ruptured as would be the case with creosote, and so green wood can be treated by this process as soon as cut.

25. The material should be left in the solution until quite cold. This insures a very thorough absorption.

26. *Burnettizing.*—The solution is made up in the proportion of 1 lb. of zinc Chloride to 5 gallons of water. Time of immersion varies from 10 to 21 days (nearly always done by pressure treatment in modern, up to date practice, as the time is reduced to 5–6 hours). Apparatus may be barrels, tanks, etc., etc.

27. *Margayizing.*—A copper sulphate solution is used in the proportion of 1 lb. of the salt to 4 gallons of water. Time of immersion is approximately 2 days for every inch of thickness of the material.

28. I think that enough has been said about Wood Preservation to form a suitable introduction to a further series of brief articles on this subject.

29. There is one more process I might mention, which may be of interest to Cypriots. It is used largely by the American farmers for preserving fencing posts. The posts are allowed to stand in a strong solution of lime water until required. They are then removed and dried. When thoroughly dry they are painted

over with a dilute solution of Sulphuric Acid (H_2SO_4). This sets up a form of case hardening where the acid was applied. It should only be used on dry soils.

30. The two chief types of preservatives are oils and salts, or a mixture of the two in definite proportions. Generally speaking the oils give better results under all conditions, whereas the majority of the salts are soluble in water and therefore cannot be used in damp soils as the salts leak out very rapidly. On the other hand salts are much cheaper and where the conditions are dry or on well drained land they have proved just as efficacious as the oils.

31. The vast majority of people to-day are under the impression that preservatives are of rather a drab and monotonous colour. There are many proprietory preservatives on the market to-day, such as "Anti-Rot", "Arbolite", "Caroboli-neum" (or Peterlineum), "Interwood", "Kerno", "Liqnolite", "Solignum", etc., etc., which can be obtained in a wide range of pleasing colours. Oak, Mahogany, Ebony, Greens, Reds, Browns, and varying in price from 1s. 8*cp*. to 5*s*. per gallon. These are known generally as the Decorative Preservatives, and when used on timber with a distinctive grain the effect is often very pleasing.

Diseases of Cereals.

BY R. M. NATTRASS, *Government Mycologist.*

III.—THE COVERED SMUT OF BARLEY.

SEVERE loss is caused to the barley crop in Cyprus by two diseases which destroy the ears as the crop reaches maturity. These are the Covered and Loose Smuts. They are easily visible to the naked eye and the blackened ears and naked ear stalks are familiar to every farmer. Both can be seen to a greater or less extent in nearly every field of barley but the Covered Smut occurs with somewhat greater frequency. This article deals with the Covered Smut only, the Loose Smut and its control will be described in a later issue.

In the Covered Smut, the contents of the grain are replaced by a black powdery mass of minute spores but this, as the name of Covered Smut implies, remains firm and is tightly enclosed by the skin of the grain and by the scales which surround the grain. Such diseased heads are harvested along with the healthy ones. During the threshing process these spore masses are broken up, spores are liberated and large numbers of them adhere to the healthy grains which thus become contaminated. Power threshing machines and the threshing-floors may similarly become contaminated and enable the spores to reach the grain from a healthy crop, subsequently threshed.

When contaminated grain, with the adhering smut spores, is sown, the grain and the spores germinate at the same time. While the plant is still very young and before it appears above ground it becomes infected by the actual penetration of the developing fungus. The fungus then continues to grow within the tissues of the young barley plant, but not with sufficient vigour seriously to interfere with its growth or in any way visibly to affect its health or appearance. The plant appears normal until the development of the ear begins. At this stage there is a burst of activity on the part of the fungus; it seizes upon the food material which would normally go to the swelling of the grain and produces the black mass of spores which replace the healthy grain.

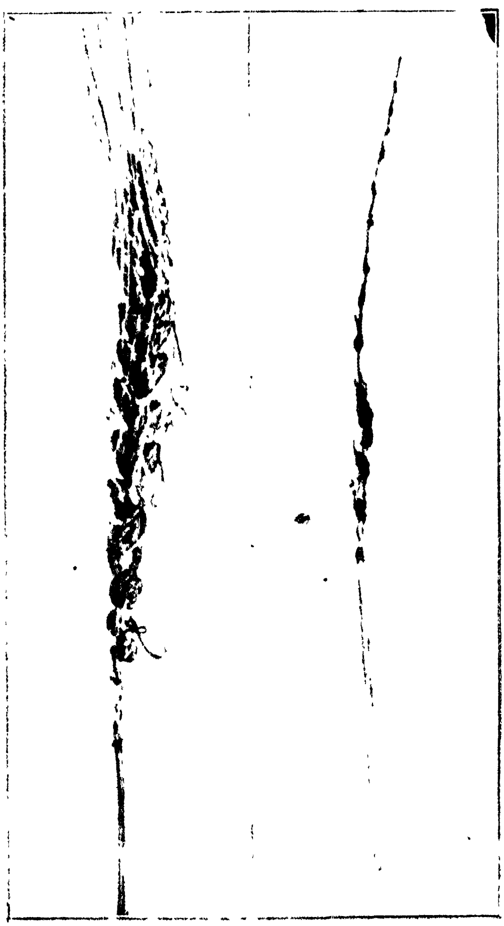

FIG 1 —The right-hand illustration shows the Loose Smut; of Barley, here the spore masses have blown away leaving only the bare stalk.
The left-hand illustration shows a head of barley affected by the Covered Smut; the black spore masses are held together by the scales.

Prevention of Covered Smut.

It will be seen from the above that the fungus causing the Covered Smut originates from spores which adhere to the outside of the grain. It does not enter the plant until after it has germinated. If, therefore, the spores can be killed without injury to the grain, the resulting crop will be free from the disease. To achieve this it is sufficient to treat the grain with a suitable poison. A well-known method is the formalin treatment. In this method the seed is treated with a solution of formalin at the strength of 1 pint of commercial formaldehyde solution to 40 gallons of water or 25 drams to 20 okes of water. The method of applying the treatment is the same as that for Covered Smut of Wheat and is fully described in No. 1 of this series (*see* "The Covered or Stinking Smut of Wheat," *Cyprus Agricultural Journal*, Vol. XXVIII, Part 3, Sept., 1933).

During the past season a much simpler method has been used with success. It has been found that dusting the seed with ordinary dusting sulphur will effectively prevent the disease. It has the further advantage over the formalin treatment in that the seed can be treated at any time and stored until required for sowing. The quantity of sulphur to use is as follows :—

1 oke of sulphur to 11 kilés of barley,

or

37½ drams of sulphur to 1 kilé of barley.

The seed and the sulphur must be well mixed so that each grain is coated with the powder. The mixing can best be done in a simple machine consisting of a drum mounted on a spindle as described in the above-mentioned article on the Covered Smut of Wheat. Such machines can be seen at the Agricultural Department and if available can be had on loan. The grain and the sulphur can also be mixed as follows :—

(1) Spread the seed in a thin layer on a stone floor or tarpaulin and sprinkle evenly with the sulphur. Then stir gently turning the mixture over and over for about ten minutes or until thoroughly mixed. The time taken will depend on the quantity taken and the number of workers stirring.

(2) Another method is to place the seed and the sulphur in a powder-proof bag, such as a flour sack. The two are then mixed by holding the bag up from alternate ends so that the mixture falls from one end of the bag to the other.

It should be borne in mind that it is not advisable to take seed from a badly attacked crop, even if the treatment can be carried out.

Thinning Deciduous Fruits.

BY B. J WESTON, *Government Horticulturist.*

THE thinning of apples, pears, apricots, plums, etc., is imperative, if fruit of the best quality and size is to be secured. In Cyprus, at the moment, thinning is looked upon as little short of criminal and the usual argument is brought forward that wind or hail usually do all (and more) thinning than is required. The fact remains that it would be difficult to find a country in which a greater proportion of small fruits of poor quality was produced.

Apart from the production of fruit of good size and quality, there are other aspects of thinning which should be taken into consideration, notable among these being the health and regularity of bearing of the trees.

It is now recognized that if fruit trees are left in an unpruned state, most of them bear well only in alternate years. So also if very large crops are allowed to remain on the tree the whole of its energy is dissipated in trying to ripen large quantities of undersized, poor quality fruit. Unfortunately this is a very common occurrence in Cyprus, and much damage is done because the trees do not then make sufficient lateral and spur growth for the production of the next season's crop. This means the receiving of a large crop of poor quality fruit one year which at the best fetches a very moderate price, and the probable loss of a profitable crop in the succeeding year.

The exhaustion of the tree, caused by the ripening of large quantities of small fruit, necessitates a rest for recuperative purposes ; this cannot be as good for the tree as bearing moderate crops regularly which entails no particular strain on the resources of the tree. Even supposing that the weight of a large crop of small fruit was approximately the same as that of a much smaller crop of good quality fruit the strain on the tree would be far greater in the first instance, as it has been proved experimentally that the production and ripening of the solid matter contained in the stones and kernels is more exhausting than the effort to produce pulp tissue alone. From all points of view, then, it may be accepted that the act of thinning is beneficial.

The operation of thinning may often be facilitated at the time of pruning, by the judicious thinning out of shoots and fruit spurs. Nowadays, in many fruit producing countries, the peach is pruned when it is in flower, superfluous blooms being removed, which obviates the necessity for heavy thinning later on.

With such fruits as the apricot and plum it is also possible to prevent overbearing by removing such twigs and laterals as are obviously overburdened with blossom, at the time of flowering. This causes no damage to the tree.

The time for the actual thinning of the fruit (in the stone fruits) is when the pips are quite soft and can be cut by a knife, *i.e.*, before the woody tissue develops and the kernels form. In apples and pears the time for thinning is when the fruit is rather smaller than a walnut. At this time no call has been made upon the tree for the chief chemical constituents which form the stones, seeds, etc., and much wasted energy on the part of the tree is avoided.

Different classes of fruit naturally require different treatment, and the disposal of the crop after picking must be taken into consideration. The fruit which is to be exported should be heavily thinned, whilst that for home markets need not be so heavily thinned.

Apricots usually bear very heavy crops and, therefore, require a lot of thinning. Peaches also nearly always require it and should be thinned out to a distance of from 4 to 5 inches between each fruit. Plums, both European and Japanese, are also tremendous bearers and if the whole crop be left on the tree, the market value of the fruit is likely to be very little and the damage to the tree considerable. To leave them from 3 to 4 inches apart throughout the tree may be said to be fairly satisfactory, but of course much depends upon the vigour of the tree and the purpose for which the crop is intended.

Pears and apples also require to be thinned. Some kinds of pears bear their fruit naturally in clusters and these should not be drastically thinned (*i.e.*, Louise Bonne). When clusters are found on most varieties, however, especially those which are recognized bearers of large sized fruits, it is better to thin out clusters to one or two pears only. Thinning the apple pays just as well as the thinning of any other fruit, and on good cropping trees single specimens should be the rule rather than the exception, at about 4 inches apart. Very large varieties require even more room for proper development.

Growers of deciduous fruits in Cyprus are earnestly requested to give thinning a trial. Once they have done so we are convinced that they will be pleased with the results obtained, both with the improved quality of the fruit and the tree, and will make "thinning" a regular orchard practice in Cyprus, as it is in every other fruit-growing country.

Reports.

THE following extracts from the March Report of the Trade Commissioner for Cyprus in London are of interest :—

"17. Sugared almonds, the trade in which was a profitable one before intense competition was met from "cut price" retailers, are almost entirely imported into the United Kingdom from foreign countries, chiefly from France, Italy, and Russia. If, as seems probable, an article of equal merit could be made in Cyprus, there should be no difficulty in selling it in this country. Complaints have been made that sugared almonds from Cyprus were found to consist of a mixture of sweet and bitter almonds, and some dissatisfaction is felt by importers.

Subject to compliance with the Customs Drawback (Sugar) Regulations, 1934, all foodstuffs composed of not less than one-half of sugar, manufactured and exported from Cyprus, now receive the benefit of a drawback of import duty. This should be of some value to the producer particularly where, as here, a new market is being explored."

"21. Since mention of Cyprus lace and embroidery was made in paragraph 38 of Report No. 17 there has developed a small trade in embroidery worked upon imported linen of fine quality.

After extensive enquiry the conclusion has been reached that while there will always be a limited market, best exploited by itinerant sellers as at present, for embroidery on brown native fabric, there is a much more important future before lace and embroidery on fine Irish linen. Wholesale importers will handle this who are not willing to deal in embroidery on a background of poor quality provided they can be assured that the designs required will be followed.

There seems to be no reason why in time lace and embroidery from Cyprus should not become as well known as that from Medeira whence, in 1932, the value of imports into the United Kingdom approached £50,000. The admission, free of Customs duties, by Order in Council No. 1574 of the 2nd of March, 1934, of linen or cloth imported for the purpose of being embroidered in Cyprus and being subsequently re-exported, should be an effective stimulus to the trade."

* * * * * *

The following report was received from the Imperial Institute on samples of pomegranate juice submitted by this Department for examination :—

I.I. Number.—18329/33.

Volume.—Each sample was about ½ gallon in volume.

Labels.—Cyprus pomegranate juice preserved with benzoic acid, in proportion 600 parts per million. 3.11.33.
Cyprus pomegranate juice preserved with sulphur dioxide in proportion 350 parts per million. 3.11.33.

Description.—Both samples were reddish-brown liquids with a fruity odour and a sweet taste. The juices were cloudy and contained a slight deposit.

Results of Examination :—

	Present Samples		Previous Sample*
	Preserved with benzoic acid	Preserved with sulphur dioxide	(Sweet)
Total Solids	16.9	17.2	17.7
Total Soluble Solids	16.7	17.1	17.6
Ready-formed Reducing Sugars as dextrose	15.2	15.6	14.2
Ready-formed Reducing Sugars as Invert Sugar	15.7	16.1	14.6
Sugars reducing only after inversion, as sucrose	0.3	nil.	nil.
Acidity, as anhydrous citric acid ..	0.4	0.4	0.4

The results are expressed as parts by weight in 100 parts by volume of juice.

Remarks.—The two juices are very similar in composition to one another and to the previous sample of sweet pomegranate juice from Cyprus.

A trade report on the juice is as follows :—

" *Storage.*—In order to ascertain the keeping quality of the juice, both samples were stored for approximately three months and during that period submitted to various temperatures. Shortly after storing, the sample preserved with 350 parts of SO2 per million and pasteurized, became fermented. The sample preserved with 600 parts of Benzoic acid per million, and pasteurized, retained its quality, except for a little darkening and increase in cloudiness.

Quality for beverage purposes.—Both samples of juice were very weak and insipid, and possessed no real fruit flavour, but a rather sickly sugary taste. The addition of a little citric acid did not bring out any fruit flavour.

* See Imperial Institute letter of 7th April, 1932.

Conclusions.—This investigation has shown that raw pomegranate juice can be successfully preserved by pasteurization together with the addition of sodium benzoate, at the rate of 600 parts of Benzoic acid per million of juice. The present samples of juice, however, are so lacking in any characteristic fruit flavour that it seems extremely unlikely that such material would be acceptable to the trade in this country."

Exportation of Onions to the United Kingdom.

(*Based on information kindly supplied by the Trade Commissioner.*)

OVER £2,000,000 worth of onions are imported into the United Kingdom annually of which more than half are from Spain. The greater part of the balance are exported from Egypt and Holland. As a British Colony and so receiving 10% preference, Cyprus is in a favourable position to compete for this trade. Production is, however, in excess of demand and prices are not likely to be high in the near future.

In order to compete in this market it is essential that the onions be of good quality, properly graded and packed and be consigned to the United Kingdom. Onions for export must be dry and hard and should be kept so by exposure to air while in storage and in transit and they should be kept as cool as possible. Spanish onions are packed in wooden slatted cases with two equidistant solid partitions; each case contains 4, 5 or 6 tiers of onions of one size only and weighs about 1¼ cwt. net.

Dutch onions are packed in bags containing 1 cwt. net, Cyprus onions should be carefully graded for size and only one size packed in each bag, the best market would be for onions between 2 inches and 3 inches in diameter.

They should be packed in 10 oz. Hessian bags. They should be well ripened before export. About 140 lb. should be packed in each bag to allow for loss by evaporation to bring the weight to 1 cwt. on arrival.

There is little demand for onions in the United Kingdom before October.

Marketing charges are approximately 1/3 per bag+5% commission. This would not include insurance or charges for cable correspondence.

SCHOOL GARDENS.

Importance of Cereal Seed Selection by the Pupils.

BY M. PAPAIACOVOU, *Superintendent, School Gardens.*

CEREAL seed selection in an agricultural country like Cyprus is of the very greatest importance as it admittedly contributes to the increase of production at no significant expenses. Our industrious farmers knowing this only too well, apply, most of them, the selection of seed either by sieving the grain or dressing it by means of the grading and dressing machine. The best method, however, of seed selection is by choosing, prior to reaping, of the largest, perfectest and healthiest ear-heads which are selected from amongst the healthiest and most fertile tillers. From the ear-heads to be thus selected we cut off both edges, retaining the middle part which contains the healthiest and stoutest grain.

Selection of Wheat Ears by Pupils of Voni School.

The Agricultural Department with a view to encouraging the pupils of the elementary schools in seed selection, organized last year, a competition amongst the pupils of the two upper school classes in 52 villages of the Colony—457 pupils took part in the competition and 139 book prizes were awarded to the most successful collectors.

A good quantity of seed was selected by the pupils which was sown either in the school gardens or plots specially leased for the purpose or in private properties, with a view to demonstrating the importance of seed corn selection in comparison to adjacent fields sown with unselected seed.

Arrangements have already been made for the repetition of this competition for seed corn selection during this year also, when the pupils of the two upper classes will select, under the guidance of the Agricultural Officer of the District and their school-master, 500 ear-heads each of them and prizes will be awarded to the most successful competitors.

It has been observed that the pupils of to-day and young farmers of to-morrow evince great zeal in their effort to make the best selection of ear-heads. Some of them go so far as to select ear-heads for preparing seed to sow the properties of their parents.

AGRICULTURAL CALENDAR.

OCTOBER TO DECEMBER.

WORK ON THE FARM AND IN THE GARDEN, VINEYARD & APIARY.

October.

Farm Crops.—Barley may be sown on dry soils but it is preferable to defer sowing wheat until the soil is sufficiently moist and in suitable condition. Slow acting fertilizers such as superphosphates may be applied before the seed is sown and nitrogenous fertilizers may be added after sowing if the weather is moist. Potatoes should be hoed and earthed up. Picking of cotton should be completed before the end of the month. Towards the end of the month, local varieties of linseed may be sown under irrigation ; preparation of fields for imported varieties continues. Harvesting and retting of hemp should be started.

Live-stock.—Special attention should now be paid to dosing sheep and goats for stomach-worm infection. The most prominent symptoms of this trouble are diarrhœa and loss of condition. When possible, do not take flocks out to pasture until the dew has dried, and avoid grazing on low-lying marshy land at this season. Large flocks should be divided into two or three lots in order to avoid excessive contamination of the pasture. In areas where flukes (avdella) are found in the liver of sheep, application should be made to the Veterinary Service for special treatment. Ewes due to lamb early in the season should receive some extra food, *i.e.*, linseed cake, crushed oats or barley and straw. Any ewes or goats which abort should be separated from the healthy animals for at least two weeks. Cattle, horses and mules should be allowed plenty of air in their stables, both by night as well as by day ; this will prevent them from getting chills when taken out to work. Regulate the food according to the amount of work the animals are doing.

Poultry.—Examine the poultry houses to make sure they are free from ticks. All walls and ceiling should be plastered with gypsum so that there are no cracks or holes in which ticks and other vermin can breed and live. The roosts should be lightly burnt by passing over a piece of burning " throumbi " or by means of a blow lamp.

Fruit Garden.—The citrus crop is now approaching maturity, all dead branches which harbour fruit rotting fungi, such as Diplodia or Black Rot should be removed as these sources of infection are liable to introduce fruit rots in orchard and packing house.

Fruit fly traps should be transferred to citrus trees as the fig crop is gathered. Traps should specially be placed on mandarine and thin-skinned orange trees as these are most readily attacked by the fly. Continue the preparation of the ground for the establishment of new orchards. If the weather is still dry, irrigation should not be discontinued particularly of the citrus trees.

Vegetable Garden.—Sow broad beans, spinach, lettuce, radish, peas ; plant suckers of artichokes and strawberries. Transplant broccoli ; earth up celeries.

Flower Garden.—Sow sweet peas, stocks, clarkia, antirrhinum, salpiglossis, collinsia, etc. Pot bulbs or plant outdoors tulips, crocus and fresias.

Vineyard.—Vintage is completed in all areas by the end of the month. Hoe round the vines after vintage is over ; this allows the autumn rains to penetrate the soil. Remove the surface roots. The practice of allowing cattle, sheep and goats to enter the vineyards for eating leaves and canes is very detrimental to the vines and this practice should be discouraged.

Apiary.—Start wintering preparations. Go through each hive in the apiary and remove the defective combs free from brood, honey and pollen. Crowd the bees by pushing close to the remaining frames a division-board. Take note of the hives that are in need of winter stores and find out whether every hive is headed with a good queen and is in possession of some brood.

Feed rapidly those in need, with thick syrup made up of two parts sugar dissolved well with one part water, before cold weather sets in, giving sufficient quantities to last till the following late spring.

On the approach of cold weather thoroughly close each hive and pack the top with dry packing material leaving but a wide flight opening or entrance at the bottom, to which fix an alighting board supported by a slanting board reaching the ground. Make the top and sides rain-proof and leave the bees quiet to hibernate without any further interference till spring.

After attending to the above directions, an occasional walk round the apiary in winter to see that no disturbance has occurred, is all that is required for safe wintering.

November.

Farm Crops.—Continue sowing barley. If good rains have fallen in October allow the weeds to come up on land intended for wheat and plough in the weeds before sowing the wheat. If the weather continues dry, delay sowing wheat until the end of the month. Sow broad beans, vicos and fodder crops. Potatoes approach maturity and early crops are raised. Gathering of cotton should be completed during this month, although if sowing was done early, it will have finished already. Cotton gathered this month will probably have been damaged by boll worms and should not be used for seed, only seed from early gatherings being saved for sowing. Cotton plants should be uprooted and destroyed as soon as the harvest is completed in order to check the breeding of boll worms. Bolls still unripe towards the end of this month are not worth troubling about, as they are sure to be damaged by boll worms and will not ripen so late in the season and should be destroyed.

November is the best month for sowing the local varieties of flax or linseed. Continue to plough, roll and harrow fields for imported varieties for fibre.

Live-stock.—The recommendations for October should again be followed, especially in regard to the treatment and management of sheep and goats. At this season, the flocks are in low condition as a result of shortage of food during the summer months, and they are, therefore, liable to heavy infestation with worms in the stomach and lungs. Losses from these causes are best prevented by giving a little hand-feeding to the flocks every morning, by avoiding overcrowding and by dosing the animals with copper sulphate solution.

Early cases of the disease of goats, known locally as "animovloyia" (Labial Dermatitis), should be looked for and the appearance of the affection should be reported without delay to the Veterinary Office.

Poultry.—Strict cleanliness and freedom from ticks and lice are the essential factors in promoting health and production in fowls.

Fruit Garden.—Continue attention to fruit fly traps and collect and destroy all fallen fruit daily.

Vegetable Garden.—Cabbages, cauliflowers and celery now become available. Continue sowing broad beans, spinach, radish, peas and lettuce. Transplant lettuce seedlings.

Flower Garden.—Bulbs should now be planted out. Flower beds renewed, manured and prepared for transplanting spring flowering seedlings.

Vineyard.—Proceed with first ploughing. Tie together the canes of the vines if they interfere with the work. Dig round the stem of the vines and prune superficial roots so as to encourage

deep rooting. Start digging the land set aside for new vineyards. Transport animal manure to the vineyard.

Apiary.—See and follow Calendar for October.

December.

Farm Crops.—Sowing of barley should be finished early this month. Wheat sowing should be carried out this month if climatic and soil conditions are favourable. Continue sowing broad beans and vicos. Fields for cumin should be prepared for sowing. Potatoes reach maturing this month and should be raised.

Cotton plants must be destroyed not later than the date notified, which is usually 15th December.

December is the latest month during which local varieties of flax should be sown. Imported flax seed varieties may be sown in December if a shortage of irrigation water in the coming spring is anticipated. Flax fields which by now ought to have been finally cultivated should be left to themselves to permit the germination of weeds which will then be ploughed in immediately before sowing the seed.

Live-stock.—Cattle and equines should be taken out for exercise at least once each day when they are not working, and they should, if possible, have a yard in which they can be turned loose for the greater part of each day except when it is raining. If it is impossible to give them this exercise, care should be taken to reduce the ration of beans, vetches or barley and to allow plenty of air and sunlight into the stables.

Sheep and goats require treatment for stomach-worm and for lice and other skin-parasites. Pregnant ewes and she-goats should be placed in separate flocks and given extra feeding for at least two weeks before they are due to give birth. If cases of abortion occur, the fact should be reported to the Veterinary Service who will advise remedial measures. Mandras should be well-sheltered with good slope for easy drainage, and they should be kept as clean as possible.

Poultry.—The utensils used for food and water should be kept thoroughly clean. If the birds are in a small enclosure, the food should always be given in a vessel of some kind—it should not be scattered on the ground which is always contaminated by droppings.

Fruit Garden.—Fruit trees, especially deciduous trees, may be transplanted. Avoid this work on windy or cold days. Holes should be opened in advance of transplanting. Staking after planting is essential, especially if the trees are of any size. Continue attention to fruit fly traps and destruction of fallen fruit.

Vegetable Garden.—As in Calendar for November.

Flower Garden.—Give special attention to bulbs. Seedlings of spring flowering plants may be potted and, if necessary, given shelter.

Vineyard.—Continue winter cultivation, plough or dig up the land.

Pruning may commence at the end of the month, if fine weather, and especially at the lower altitude.

Use animal manure where necessary.

Continue propagation by layering.

Collect cuttings for new plantations and bury them, after 24 hours immersion in running water, in the earth.

Continue preparation of the land for new plantations.

Apiary.—See and follow Calendar for October.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

JUNE, 1934.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall: Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District:							
Nicosia	92.30	65.60				0.21	
Athalassa		—				0.05	—
Morphou	90.16	60.60	0.27	1	0.27	0.03	
Makheras						0.43	-
Famagusta District:							
Famagusta	93.00	65.76	1.30	1	1.30	0.24	—
Akhyritou	90.30	64.80	1.14	1	1.14	0.20	
Rizokarpaso ..		—				0.10	
Lefkoniko						0.28	-
Larnaca District:							
Larnaca	92.50	68.30				0.14	—
Lefkara			0.16	1	0.16	0.15	-
Limassol District:							
Limassol	88.70	62.57				0.07	—
Saittas			0.20	1	0.20	1.31	—
Trikoukkia... ...	—		0.25	1	0.25	0.42	—
Alekhtora	-					0.14	—
Paphos District:							
Paphos	80.10	64.63				0.14	—
Polis...			0.05	1	0.05	0.09	
Kyrenia District:							
Kyrenia	84.25	66.16				0.05	—

Note.—Compiled from returns taken by Public Works Department.

JULY, 1934.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	98.16	70.22		—		0.07	-
Athalassa	—	—			—	0.01	
Morphou	94.22	66		—	—		
Makheras		—	—	-	-	0.18	
Famagusta District :							
Famagusta	101.26	70 32	—	—	-	0.07	—
Akhyritou	94	70 1		—	-	0.02	
Rizokarpaso ..		-	-	-		0.04	-
Lefkoniko	—			-	-	0.32	—
Larnaca District :							
Larnaca	82 7	76.3			—	0.07	—
Lefkara					—	0.06	-
Limassol District :							
Limassol	97.06	66.97	-		—	—	-
Saittas			0 09	3	0.05	0.67	—
Trikoukkia	—	—		-	—	0.11	
Alekhtora					—	0.13	
Paphos District :							
Paphos	83 22	70			—		
Polis...					—	-	—
Kyrenia District :							
Kyrenia	89.71	60 71			—	0 01	

AUGUST, 1934.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	97	68.87	—		—	0.09	—
Athalassa			-	—	—	0.03	—
Morphou	92.94	65.47		—		0.07	-
Makheras	-		—		—	—	—
Famagusta District :							
Famagusta	101.42	71	0.05	1	0.05	0.05	—
Akhyritou	94.7	69.1	-	—	—	—	—
Rizokarpaso ...		—	—		—	0.04	—
Lefkoniko			0.09	1	0.09	0.05	—
Larnaca District :							
Larnaca	96.74	75			—	—	—
Lefkara			0.08	1	0.08	0.008	—
Limassol District :							
Limassol	90.48	67.32	0.01	1	0.01	0.001	—
Saittas	—	-	0.20	2	0.13	0.13	—
Trikoukkia	—		—	—	—	0.09	—
Alekhtora	—		-	-	—	—	—
Paphos District :							
Paphos	85.4	76.32	-		—	0.05	—
Polis...		—	—	-	—	0.01	—
Kyrenia District :							
Kyrenia	94.61	76.2	—	—	—	0.05	—

Note,—Compiled from returns taken by Public Works Department,

EDITORIAL AND ADVERTISEMENT NOTICES.

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

Copies of the *Cyprus Agricultural Journal* can be obtained on application to the Department of Agriculture, price 3*cp.* per number, or by post 4*cp.*

Annual subscription payable in advance 16*cp.* post free. Overseas subscription 18*cp.* (2/-).

SCALE OF ADVERTISEMENT CHARGES.

A uniform reduced rate is charged for all advertisements which covers their insertion in the English, Greek and Turkish issues respectively.

As special efforts are being made to increase the circulation of the Journal in the Colony and Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force :—

COVER—Full page, 1 year or 4 insertions	...	£2	15	0
INSIDE PAGES—Full page, 1 year or 4 insertions		2	8	0
„ Half page „		1	4	0
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Advertisements should be written on one side of the paper only, and should reach the Editor, *Cyprus Agricultural Journal*, not later than the 10th of the month of issue.

The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

Short Price List of Publications for Sale at the Government Printing Office, Nicosia, Cyprus.

AGRICULTURE, FORESTS & MINERALS.	s.	cp.
Agricultural Report, Annual, 1901–2, by P. Gennadius	0	3
do. 1902–3 do. ...	0	4½
Agriculture—Report for the year ended 31.12.32	3	0
,, Report for 1933	3	0
Cupriferous Deposits, by Professor C. G. Cullis and A. B. Edge—1927...	20	0
Forest Conservancy, by P. G. Madon—1930 ...	3	0
Forestry, Report on, by D. E. Hutchins—1909 ...	5	0
Forests of Cyprus, by Dr. Unwin—1927	2	4½
Forestry, Summary of Report by R. S. Troup—1930	1	0
Forests and Grazing (G. or T.)	0	2
Geology of Cyprus, by C. V. Bellamy and A. J. Jukes-Browne—1905	5	0
Insect Pests and Fungus Diseases, by H. M. Morris (E., T. or G.)—1932	0	4½
Inspector of Mines, Annual Report, 1930, 1931, 1932, 1933 ... ... (each)	1	0
Irrigation Work in Cyprus, Report on, by Col. W. M. Ellis	10	0
Mineral Substances Utilized in the Arts, by P. Gennadius—1905	1	0

STATISTICAL & GENERAL INFORMATION.		
Annual Reports (Governor's) to 1919-20	0	3
do. do. 1920	0	7
do. do. 1921	1	0
do. do. 1926	2	0
do. do. 1929	1	6
do. do. 1930	1	6
do. do. 1931	2	6
do. do. 1932	2	6
do. do. 1933	2	6
Blue Book (Annual) to 1933	4	0
Census Report, 1901...	1	0
do. 1911...	4	0
do. 1921...	5	0
do. 1931 (with abstracts, 101 pp.) ...	7	0
do. 1931 (abstracts only, 73 pp.) ...	5	0
do. 1931 (without abstracts, 28 pp.) ...	2	0
Cyprus Customs : Schedule of Duties & Fees—1933	2	0
do. —1934	2	0
Disturbances in Cyprus in 1931 : A report presented to Parliament—1932 (T. or G.) ...	0	4½
Education in Cyprus, Report on, by J. E. Talbot and F. W. Cape—1913	1	4½
Education—Report for the School Years 1930–31 and 1931-32, 1932–33 ... ... (each)	2	0

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The

Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXIX, Part 4 DECEMBER, 1934 Price 3cp.

EDITORIAL NOTES.

TOWARDS the close of the year the agricultural situation and outlook have improved considerably and the prospects are better than at any time during the past 3 years. Autumn rains although not plentiful have been fairly well distributed throughout all districts and the planting of cereals is well advanced. At the time of going to press copious rains have fallen throughout the Island and the prospects for abundance of cereal production, an improvement in the grazing situation and a return to normal of the domestic and irrigation water supplies appears to be fairly well secured for 1935.

* * * * * *

VINE NOTES.

The vintage was earlier than usual this year and production some 20% below average, but the quality of the grapes was good. Weather conditions continued favourable during the raisin and wine-making season. The production of scalded raisins is estimated to be some 1,500 tons. There is also an improvement in the quality and production of sun-dried raisins. The quality of the wines is satisfactory, they are of a higher alcoholic strength but poor in colour. Trade in wines with Egypt has revived on account of the revised tarriffs on alcoholic content which are now more favourable for Cyprus wines.

* * * * * *

The price list of plants and seeds for sale at Government Nursery Gardens has been revised and the new prices now in force are :—

Citrus Fruit Trees (Grafted)	.. 4½*cp.* each
Deciduous Fruit Trees (Grafted) ..	.. 4½*cp.* each
Bush Fruit Trees	.. 1*cp.* each

Other Fruit Trees	$4\frac{1}{2}$*cp.* each
Carobs, Almonds and Figs	1*cp.* each
Forest Trees	$0\frac{1}{2}$*cp.* each
Industrial Plants	1*cp.* each
Vines (Rooted cuttings)..	5 *paras* each
Roses (Rooted cuttings)	1*cp.* each
Blackberries and Loquats	$0\frac{1}{2}$*cp.* each
Strawberry Runners	5 *paras* each
Ornamental plants hardy perennials	3*cp.* each
Ornamental plants hardy herbaceous	1*cp.* each
Mulberry (Grafted)	1*cp.* each
Vegetable and flower seedlings	5 *paras* each
Vegetable and flower seeds	1*cp.* per pkt.

Plants and seeds are offered only subject to supplies being available.

Not more than 50 trees of any one variety will be supplied to any individual except under special circumstances and when authorized by the Director of Agriculture.

Terms: Strictly cash.

Applications for supplies may be made to any officer of the Agricultural Department, and they should be made well in advance of the date when the plants will be required.

* * * * * *

BEAN APHIS.

At this time of the year the attacks of this pest usually appear and bean crops should be watched so that the commencement of the attack can be seen and its spread be checked. The spraying of a crop of beans is a somewhat difficult and relatively expensive operation if it is done when the plants have become large, but if the attack is seen in its earlier stages when only a few plants are attacked and while the plants are still small, then the removal or spraying of these plants or cutting off and destroying the attacked parts of them will help considerably to prevent a severe attack developing later on.

* * * * * *

HIBERNATION OF SILKWORM EGGS.

Suitable accommodation in a house at Pedhoulas has been rented by the Agricultural Department for the hibernation of all locally produced and imported silkworm eggs, where they will be under the supervision of a Sericultural Inspector.

It has been decided that Pedhoulas is the most suitable place for this hibernation owing to the temperature there being relatively constant and this village is conveniently accessible for the purpose.

SERICULTURAL STATION, KALOPANAYIOTIS.

Rearing of 20 different races and crossings of silkworms was carried out this year in the Sericultural Station, Kalopanayiotis. Silkworm eggs produced from some of these rearings are available for sale next sericultural season, primarily to silkworm egg producers for reproduction and for the improvement of their own races.

A quantity of the eggs will be issued to Girls' Schools for demonstrational silkworm rearing and the remainder will be available for sale to cocoon producers.

* * * * * *

STUDY OF BIRD MIGRATION.

It was reported during the past autumn that two bee-eaters captured in Larnaca District were found to bear numbered rings. Information has now been received that one of these birds, captured on 24th September, 1934, had been released near Sindel, in the district of Provadia in north-eastern Bulgaria on 11th June, 1933, and had, therefore, carried its ring for over a year, while the other bird, which was caught on 25th September, 1934, was released at Jerki, in the Government of Kijeiv, Ukraine, Southern Russia, on 21st July, 1934.

The marking of birds by means of numbered rings placed on their legs is being carried out in several countries in Europe, and it is hoped by this means to obtain valuable information regarding their movements during their migrations. Such information has already been obtained by similar means in the cases of the swallow and the white stork.

Although many thousands of birds of various kinds are ringed at great trouble and expense, only a very small proportion of them are found again, and it is, therefore, important that any rings which are found should be returned to the authorities concerned, and it is particularly requested that any rings which may be found should be returned either to the address given on the ring, or to the Agricultural Department to be forwarded. The date and place where the bird was found should always be given as this is very important as it indicates the length of time which the bird has required for its journey.

* * * * * *

APPOINTMENT OF MANAGER, STOCK FARM.

Mr. J. P. Maule, Superintendent of Agriculture, Nigeria, has been appointed to the post of the Manager, Stock Farm, Athalassa, which became vacant on the retirement of Mr. G. Barrett. Mr. Maule assumed duties at Athalassa on the 27th September, 1934.

PIGS AND POULTRY FOR ATHALASSA.

Three boars and three gilts of the Large Black breed of pigs have been purchased in England for Athalassa Stock Farm. The boars have been specially selected from herds of repute for use as Stud Boars in Cyprus.

Amongst the new imported poultry are included :—

1 pen of Rhode Island Reds.

1 pen of White Leghorns.

1 pen of Light Sussex.

Each pen consists of one cockerel and eight pullets. An additional Rhode Island Red cockerel and a Light Sussex cockerel have also been purchased.

All the above poultry were bred from hens with good laying records at Messrs. Chivers & Sons estates, Histon, Cambridge.

* * * * * *

PRIZES FOR SCHOOL GARDENS.

The Colony prize for the best school garden, for the school-year 1933–34 was awarded to the schoolmasters of Gypsos Village School, Famagusta District, Messrs. Christoforos Loizou and George Nicolaou. The best gardens in the other Districts were as follows :—

Nicosia District ..	.. Evrykhou and Eylenja.
Larnaca ,, ..	.. Aradhippou and Kiti.
Limassol ,, ..	.. Agros.
Paphos ,, ..	.. Yeroskipos.
Kyrenia ,, ..	.. Karavas.

* * * * * *

DEMONSTRATIONAL SILKWORM REARING IN GIRLS' SCHOOLS. 1933–34.

The usual arrangements for conducting Demonstrational Silkworm Rearing in Girls' Schools was carried out by the Agricultural Department in co-operation with the Education Department.

These demonstrations were arranged at 125 Greek and 13 Turkish Girls' Schools and 1,648 school girls followed the demonstrations from the hatching of the silkworm eggs to the production of the cocoons. The highest production was 78 okes cocoons per ounce of silk seed and the average production for 128 schools was $45\frac{13}{400}$ okes. The production of the previous year was $69\frac{1}{4}$ okes and 42 okes respectively.

These satisfactory results clearly demonstrate the value of this work in assisting to improve the standard of production amongst the cocoon producers in the villages.

Prizes were awarded to 72 schoolmistresses of 42 different schools and the best prize was won by Miss Antigoni Ioannides, schoolmistress of Kolóssi.

CHANGE IN TITLES OF AGRICULTURAL OFFICERS.

As from 1st January, 1935, certain changes in the titles of the Agricultural Field Staff will be brought into effect.

The Government Horticulturist becomes Superintendent of Agriculture and the three Assistant Inspectors of Agriculture become Assistant Agricultural Superintendents.

The Superintendent, School Gardens, Senior Sericultural Inspector and three District Agricultural Superintendents, will be graded as Agricultural Officers. All former Agricultural Supervisors and Agricultural Assistants, 1st and 2nd Grade, will in future be classed as Agricultural Assistants.

This new regrading of the Field and District Staff, in addition to simplifying titles and placing the various officers on an improved incremental scale, is a further step in the reorganization of the District Staff introduced last year in the improvement of the service to the Agricultural community for itinerant agricultural instruction.

AGRICULTURAL PRODUCE (EXPORT) LAW, 1933.

The Regulations now in force under the Agricultural Produce (Export) Law for the inspection of citrus fruits and pomegranates have been revised and new Regulations for citrus fruit only will come into force on the 1st January, 1935. The new Regulations were published in the *Cyprus Gazette* of 7th December 1934.

Report on Psyllium Seed from Cyprus.

BY THE IMPERIAL INSTITUTE.

THE sample of Psyllium seed which is the subject of this report was forwarded to the Imperial Institute by the Director of Agriculture.

The seed had been grown at the Central Experimental Farm, and it was desired to ascertain its quality and commercial value.

DESCRIPTION.

The sample weighed 21 lb. and consisted of glossy, chocolate-brown, small ovoid seeds, a few of which had partly lost their hard outer covering.

The present seeds were found to resemble a commercial sample of French Psyllium seed in lustre but to be somewhat darker in colour. They were of much better appearance than the previous sample from Cyprus (see Imperial Institute report dated 18th November, 1932), which had a dull, steely surface.

RESULTS OF EXAMINATION.

The dimensions and weight of the seeds were determined and are shown in the following table, together with the corresponding figures for the sample of Psyllium seed from Cyprus referred to above, and those for commercial samples of Spanish and French Psyllium seed :—

	Length (approx.) *mm.*	*Breadth (approx.)* *mm.*	*Weight of 100 seeds* *grams.*
Present sample	2.5	1.5	0.13
Previous sample from Cyprus	3.0	1.5	0.13
Commercial samples :—			
Spanish	2.0	0.5	0.06
French	3.0	1.5	0.15

The moisture and oil content of the present sample are shown below, together with those of the earlier sample from Cyprus and of samples of commercial Spanish and French Psyllium seed used for comparison :—

	Present Sample	*Previous Sample from Cyprus*	*Commercial Samples* *Spanish*	*Commercial Samples* *French*
	%	%	%	%
Moisture	11.5	8.3	11.7	10.7
Oil	6.4	7.0	6.4	8.2

The swelling factors of these four samples were determined by H. W. Youngken's modification of Clevenger's test, and were found to be as follows :—

Present sample	17.5
Previous sample from Cyprus	14
Spanish seed	17
French seed (1)	11
do. (2)	13

These results show that the present sample of seed has very satisfactory swelling power.

COMMERCIAL VALUE.

The seed was submitted to the two firms of importers in London who reported on the previous sample received in 1932. The first firm furnished the following observations :—

"We would say that this compares very favourably with the French seed. The demand, however, has fallen off tremendously in the last few years and the "fad" which advertising created in America for this article has practically died out.

We are certainly of the opinion that there is no scope for the Island to cultivate this on a commercial scale, and for your guidance we would say that it is possible to-day to buy either the French or the Italian seed at 30s. per cwt. c.i.f. London—a material decline since we wrote two years ago."

The second firm stated that "actually the sales of Psyllium seed have fallen off very considerably of late," thus confirming the information given above.

REMARKS.

The present sample of Psyllium seed is of more attractive appearance than that received from Cyprus in 1932, and is superior in mucilaginous properties both to the latter sample and to the commercial French seed which was used for comparison. In view, however, of the small demand now existing for the seed, and to the fact that supplies are obtainable from France, Spain and Italy, it is doubtful whether under present conditions it would be worth while to produce it on a commercial scale for shipment.

THE DAIRY INDUSTRY IN CYPRUS

Production and Disposal of Dairy Products.

BY A. PITCAIRN, *Assistant Director of Agriculture.*

As Official Delegate for Cyprus attending the 10th World Dairy Congress held in Italy in the spring of this year, I made investigations prior to my departure to Italy on the production and disposal of dairy products in Cyprus, and the following is a summary of a memorandum prepared on this subject :—

GENERAL.

Dairy products constitute one of the leading if not the most important item of diet of the Cyprus rural community. Fresh milk is not consumed by the Cypriot to any considerable extent but locally made milk products in the shape of cheese, hallumi, butter, yiagourt and mahallepi represent a valuable food commodity of the Island. Most of these products are either prepared in the home, or in small dairies for sale in the village or to neighbouring villages, while in certain centres and towns a number of dairymen are engaged in the manufacture of cheese for export which item takes an important place in the export trade.

The dairy industry in Cyprus is dependent upon sheep and goats, only in the large towns are dairy cows kept to supply the demand for fresh cows milk. The long dry summer, the absence of suitable grazing and the high cost of producing fodder crops do not encourage the Cyprus farmer to keep dairy cows unless there is an assured market for the milk, but there are possibilities for development in this direction as improvement in animal husbandry, pasture management and fodder crop production takes place.

Cheese makers are finding more difficulty in marketing their products abroad in face of competition from other countries producing similar types of cheese and the imports of dairy produce tends to increase and gradually oust the Cyprus product in the local market. In view of this the dairy industry, like many other industries meeting keen competition, requires constant attention, if it is not to decline, in order to maintain, improve and expand it from all its aspects, both in regard to the methods practised in animal husbandry and in the manufacture of dairy produce.

With the necessary support given by the Department of Agriculture, together with the whole-hearted co-operation of the farmers and producers, there is every chance for the Island to retain and improve its position in this industry.

BREEDS OF CATTLE, SHEEP AND GOATS.

Cattle.—The native cattle of Cyprus before the British Occupation were mainly bred for draught purposes and a very suitable type of draft animal is still produced. There are two distinct native types, namely, the "Messaoria breed" and the "Paphos breed." The "Messaoria breed" is a largely heavy animal suitable for the plains and the "Paphos breed" a small animal adaptable for the mountains and hills. Since the British Occupation a considerable trade has developed in export of live-stock to nearby countries for fresh meat and with a view to improving the Cyprus cattle for meat and milk production different breeds have been imported from time to time and work on selection and grading up of native breeds have been carried out more especially since the establishment of the Athalassa Stock Farm in 1902.

Native cows are very poor milkers but steps have been taken to improve the milk yield and quality of meat of the local breed by selection without deteriorating the value of the animals for draught purposes. Special attention has also been given to encourage local dairymen to keep pure bred, half-bred or selected local dairy cows.

Sheep.—The Cyprus fat-tailed sheep are considered by some authorities to be indigenous to the Island, they are similar to the Syrian race of fat-tailed sheep.

Apart from the import of two Merino rams and six Merino ewes for improvement of wool production, no breeds of sheep have been imported by Government to improve the milking qualities of Cyprus sheep.

Goats.—The native Cyprus goat like the fat-tailed Cyprus sheep are considered to be a Cyprus type of the Asia race.

Different breeds of goats have been imported from time to time and an improved type of goat is kept in a number of villages. Maltese goats were introduced in 1930 with a view to improving the milk yield and to encourage the shepherds to abandon, for a more productive and less destructive animal, the semi-wild native goats which cause so much depredation in the forests.

MANAGEMENT, FEEDING AND BREEDING OF CATTLE, SHEEP AND GOATS.

Cattle.—There are over 43,000 head of cattle, but cattle breeding in Cyprus in the sense of breeding, rearing and maintaining a herd of cattle as a business is not practised. Farmers as a rule possess only a few animals for draught purposes and raise a calf or two a year for sale or to replace animals for draught. The cattle are grazed on natural pastures from March to October, green barley, green maize and lucerne are fed if

available. Draught animals during winter are housed in rather primitive stables and a ration of vetches, oats and chopped straw is fed.

Cows in town dairies are stall fed and given a ration of foodstuffs easily available in Cyprus consisting of chopped straw, bran, broad beans, barley, carobs and sesame cake. The broad beans, barley and carobs are sometimes substituted by vetches, oats or linseed according to circumstances. In spring and summer green fodder is given.

Breeding is carried on throughout the year, but efforts are made to arrange for cows to calf during the season January to April when green forage is plentiful.

The calves suckle for 6 to 7 months.

Sheep.—Flocks are grazed on the natural pastures and on stubble after harvest, green forage is given when available. In the plains flocks of sheep and goats are grazed together and in winter they are brought into mandras or compounds with open shelters. These compounds are usually too small and unsuitable to accommodate the number of animals placed in them and the overcrowding and unhealthy conditions results in loss of condition and the animals become easily susceptible to disease and various ailments. With better shelter accommodation and hand feeding when natural grazing is poor, the returns from the flocks through improving the milk supply as well as the wool and mutton would be considerably increased.

The breeding season is during July and August, early lambs appear in November and the lambing season continues during December and January.

Goats.—The management of goats is similar to that described in the preceding note on sheep. In the hill villages herds of goats only are kept. Tethered goats which are hand fed are given a ration of vetch straw, bran and broad beans. Green fodder is fed when available.

The breeding season is during August and September and the kids are born during the months of December, January and February.

The lactation period for sheep is approximately 3½ months usually from January to April and the daily yield varies from 100 to 150 drams per day. The lactation period for goats is for a period of 5 months from January to May and a yield of from ½ to ¾ oke and oke of milk is given daily. Hand fed goats of selected breeds give 1½ to 2 okes milk daily.

DAIRY PRODUCTS.

Hallumi.—This is a product peculiar to Cyprus and is manufactured in all parts of the Island for local consumption. Only very small quantities are exported when the material is fresh and can command a good price. This form of cheese is made either with sheep or goats' milk or with a mixture of sheep and goats' milk. The following is a description of the general procedure adopted in the making of hallumi :—

> The milk is heated to a temperature of from 85° to 90° F. when rennet is added, after thirty to forty minutes the curd is ready to cut. The curd is broken into small pieces by hand, left for a few minutes to settle, then heated gently to 110° to 120° F. During heating the mixture is stirred continuously to keep the small pieces of curd separate. When the curd becomes sufficiently firm it is gathered from the vat and placed in cheese moulds and pressed by hand ; no weights are used in pressing. After one or two hours the cheese is taken from the mould, cut into pieces and boiled in whey. When the cheese floats on the boiling whey it is removed and placed on a cheese table and sprinkled with salt and allowed to cool. The cheese is then flattened by hand and sometimes double folded and placed in tins or earthern receptacles which have been filled with sterilized whey sufficient to cover the cheese. Well made and properly stored hallumi keeps in good condition for a year.

Kefalotiri.—A type of hard cheese made from either sheep or goats' milk or a mixture of both. This type of cheese is made by experienced cheese-makers for the export trade. Rennet is added when the milk is heated to a temperature of 90° F. and coagulation takes place in 30 to 40 minutes giving a curd of rather firm consistency. The curd is cut with special knives into small pieces, the size of a wheat grain. It is then heated to a temperature of 110° to 120° F. The whey is removed and the curd placed in cheese moulds lined with cheese cloths and pressed with a weight double that of the cheese. After an hour the cheese is removed from the press, wrapped in a fresh clean cheese cloth and again placed in a mould and returned to press with increased pressure. This process is repeated from morning to evening at regular intervals until the final pressure is 16 to 20 times the weight of the cheese. When the cheese is removed from the press it is placed in the curing room where it is rubbed with salt and turned over every day for 10 to 14 days. The cheese is usually ripe and ready for use two to three months after making.

Kaskavalli.—A type of hard cheese similar to the kefalotiri type above described. The process of manufacture is the same as for kefalotiri until the cutting of the curd. The curd is cut into large pieces and removed in a large cloth. After standing for a few hours fermentation takes place. It is again cut into pieces, placed into baskets and heated in the milk residue for ten minutes; the subsequent procedure is similar to that for kefalotiri.

Paphos Cheese.—The procedure in making this type of cheese is similar to that for hallumi up to the time the cheese is placed in the moulds and pressed. The Paphos cheese remains in the moulds for one day after which it is removed and rubbed with salt and placed in the sun to dry.

Anari.—A type of soft cheese made from milk residue. It is manufactured by heating the whey until coagulation takes place. The cheese is collected from the surface of the liquid and placed in baskets and left to stand until the excess liquid drains away, it is then salted and dried in the sun. This type of cheese is of poor quality and is usually sold locally and used when fresh. Better quality anari is sometimes prepared by the addition of 2% to 3% of whole milk. Other types of soft cheeses manufactured in the larger dairies for the export trade are Telemes and Phetta cheeses.

Yiagourt.—A milk product consumed in considerable quantities in Cyprus. Sheep milk when fresh and clean is considered the best milk for making yiagourt. The process of making yiagourt is by heating the milk to boiling point and keeping it at this temperature for fifteen minutes. It is then allowed to cool when one desert spoonful of wholesome sour milk or yiagourt, two to three days old, is added to every oke and stirred for a few seconds. The container in which the yiagourt is being prepared is kept near the fire at an even temperature for three to four hours when coagulation takes place.

Mahallebi.—A milk product consumed mainly in the towns and larger villages. It is made from a mixture of 1 oke sugar, 1½ okes milk and ½ oke of ground rice.

Butter made from sheep and goats' milk is prepared for local use.

There are many variations in preparing dairy products in practice in different parts of the Island and the above is only a brief outline of the products and methods followed in their preparation.

EXPORTS AND IMPORTS OF DAIRY PRODUCE.

Cheese is the only product exported from Cyprus. This product is mainly dependent on exports to Egypt but fair quantities are exported to Syria, United States of America, Sudan and other destinations.

The quantity and value of the exports of cheese during the five years 1929 to 1933 are :—

Year	*Quantity* cwt.	*Value* £
1929	5,183	21,672
1930	4,812	20,751
1931	4,123	13,689
1932	3,588	15,902
1933	4,507	15,586

The average quantity exported during the five years period given above was 4,412 cwt. valued at £17,520 as compared with 4,831 cwt. valued at £19,644 the previous five years. This decline in exports is attributed to a great extent to the prolonged drought 1931–32 and 1932–33 and as mentioned at the beginning of this Memorandum to a certain extent to the competition with other producing countries in the Egyptian market.

The imports of dairy produce for the last five years are as follows :—

Year	Milk (preserved)		Butter		Cheese	
	Quantity cwt.	Value £	Quantity cwt	Value £	Quantity cwt.	Value £
1929	2,139	6,854	1,050	9,874	766	3,942
1930	2,314	7,372	1,298	9,140	1,141	4,451
1931	2,028	6,089	1,371	9,346	715	2,696
1932	1,964	5,927	1,122	7,903	1,306	5,146
1933	1,727	5,188	1,222	7,509	673	2,203

A comparative statement of the average quantity of imports of milk, butter and cheese for the five years 1929–1933 with the five years 1924–1928 is as follows :—

Five-year period	Milk (preserved)		Butter		Cheese	
	Quantity cwt.	Value £	Quantity cwt.	Value £	Quantity cwt.	Value £
1924–28	1,560	5,645	1,072	9,090	604	3,278
1929–33	2,034	6,286	1,212	8,754	920	3,687

The imports of butter during the five-year period shows a slight increase while that of milk and cheese a good increase. The increased imports of cheese were mainly from Bulgaria during the drought years 1931, 1932 and 1933 to replace the shortage in the local product brought about on account of the lack of milk supplies, at the same time there is a tendency for imported cheese to replace the local produce.

Legislation.—Milk and Dairies and the Sale of Food (Milk) Regulations, 1926.

The Regulations for the control of milk and milk products are enacted under the Sale of Food and Drugs Law, 1926.

The Chief Veterinary Officer, who is Dairy Registration Authority, reports that "this legislation has been applied in Cyprus since early in 1927 and the number of cow-keepers and dairymen registered to 31st December, 1933, was 176 and 245 respectively. Very considerable improvements have taken place in the hygienic housing and management of milking cows and in the distribution of their milk. There is increasing interest in the proper cooling and bottling of the milk. All cows in registered dairies are tested regularly for tuberculosis and only one reactor was discovered during the past three years.

Prior to enforcement of the Milk and Dairies Regulations the manufacture of "yiagourt" (sour milk) was largely carried out by the very poor classes and under conditions which can only be described as filthy. This work is now carried out only by those who have provided a special room or rooms, with proper drainage, fly-proof doors and windows, sufficient lighting and clean fittings and utensils."

The total number of sheep and goats in the Island is 304,437 and 224,030 respectively and the value of butter and cheese produced from sheep and goats milk in a normal year is placed at over £150,000 per annum. When the value of fresh milk and milk products other than butter and cheese is included as well as meat, hides, skins and wool besides the export trade in live animals, it will be realized that the dairy side of the animal husbandry industry in Cyprus forms no mean part of the Island's resources and wealth.

Agricultural Shows.

THREE Agricultural Shows have been held since the issue of the September Journal. Famagusta District Tobacco and Broom Corn Show was held at Yialousa on the 28th October, 1934, an Agricultural, Industrial and Animal Show at Kyrenia on the 17th and 18th November, 1934, and an Agricultural and Animal Show at Morphou on the 9th and 10th December, 1934.

The Yialousa Show, which was exclusively for various classes of tobacco, broom corn and brooms, was organized by the Yialousa Village Authorities and some of the leading Yialousa tobacco growers under the direction of the District Agricultural Superintendent, Famagusta. The show was opened by the Director of Agriculture and there was a good attendance of visitors from Yialousa and neighbouring villages in the Karpas. The tobacco classes of exhibits were for baled and unbaled yellow leaf and Latakia types of tobacco. Some of the exhibitors from Lefkoniko secured a number of prizes for their yellow leaf tobacco. Most of the prize winners were Yialousa tobacco growers but exhibitors from Rizokarpaso, Trikomo, Ayios Symeon and Lysi, figured in the prize list. In all some £20 was distributed in prize money.

Prize Winning Mules at Lysi Agricultural Show.

Both the Kyrenia and Morphou Shows were opened by His Excellency the Governor. The Kyrenia Show was organized by the Kyrenia Municipal Corporation and Mr. Ch. Demetriades, the Mayor, spared no efforts to make the show a success. Citrus fruits, carobs and olive-oil figured prominently in the exhibits, while the entries for cereals and vegetables were small. The exhibits of embroidery, laces and pottery were of a good standard, while furniture, agricultural tools and other local handicrafts

were on view. The animal exhibits although few in number in each class created a good deal of interest. £52 were distributed in prize money and it is estimated over 3,000 persons visited the show during the two days. The Morphou Show was successfully organized by Mr. E. G. Ierides, Mayor of Morphou, through the Municipal Corporation of Morphou, in collaboration with the various Village Authorities in the Nahieh of Morphou. Exhibits were well representative of the Morphou area. Cereals and exhibits of flour were well represented, other exhibits included citrus, beans, cumin, vegetables, olive-oil, nuts, various fruits and honey. There were special sections for embroidery and lace work as well as furniture and agricultural implements. The various animals were fairly well represented. The total amount distributed in prize money was £40 and over 8,000 visitors are estimated to have visited the show in two days.

At the Kyrenia and Morphou Shows, officers of the Veterinary, Entomological and Mycological branches of the Agricultural Department were available to give information and advice to farmers. Thanks are due to the ladies and gentlemen who acted as judges of the various exhibits at all the shows.

Citrus Trial at Morphou.

PRELIMINARY NOTE.

IT has long been felt that systematic work on some of the commoner problems confronting citrus growers should be started, but, save for the establishment of a trial at Famagusta a few years ago, lack of sufficient land and a good supply of irrigation water in any of the other district stations of the Department has prevented such work from going forward. The discovery of a good supply of irrigation water at the Central Experimental Farm, Morphou, has now to a large extent removed these obstacles and preparations are being made to lay down a trial designed to answer questions as to frequency of irrigation, planting distance, the advantages or otherwise as a stock of the bitter orange (*citrus aurantium*) over the sweet lime—or sweet lemon as it is known locally (*citrus aurantifolia*). In addition the trial will be so planned as to make possible the carrying out of fertilizer trials when the trees are in full bearing.

The trial as at present planned will cover some 30 donums of land and will be situated at the Central Experimental Farm, which is destined eventually to become the chief experimental station of the Department, being itself in the centre of a rapidly developing citrus growing area. The climatic and soil conditions at the Central Experimental Farm are different from those obtaining at Famagusta where a somewhat similar trial is in

progress and apart from its experimental value the trial will serve as a demonstrational centre of methods of cultivation, irrigation and general orchard management for that particular area of the Island.

The plan of the trial which is rather complex in character consists of 8 irrigation blocks each containing 4 plots for a planting distance trial with each plot sub-divided for the stock and manurial trial. It was drawn up with the kind co-operation of Mr. T. N. Hoblyn, of East Malling Research Station, who placed his wide experience of horticultural experimentation at the disposal of the Department and who also kindly offered to come to our assistance should difficulties arise later on.

Very careful preparation of the young trees upon which the trial is to be based is an essential step, because any lack of uniformity in the performance of this material would be responsible for an uncontrolled factor in the inherent variation of the trees themselves. Such variation was the cause of failure to secure significant results in the earlier attempts at experimentation with fruit trees in other countries.

Clearly, if we are to judge the effect of different treatments, different planting distances, different stocks and different irrigations, we must be sure as far as is possible under present conditions, that the trees would show a uniform performance if planted the same distance apart, on the same stocks and under the same conditions of irrigation and manuring. Thus every effort must be made to guard against variation among the trial trees, even at the expense of delay in planting.

No technique is at present known for the production of citrus stocks on a large scale by vegetative methods such as is possible with most types of deciduous fruit trees, otherwise the raising of a uniform batch of citrus stocks would be a much more simple matter than it now is. For want of a better method recourse is, therefore, had to rigorous stock selection, in every phase of nursery growth and also to bud selection, to secure as near as possible uniform trees.

Both the bitter orange and sweet lime seed to be used will be taken from the fruit from single trees of each type which are carrying large crops of uniform good quality fruit, free from disease and true to type. From the time of sowing in the seed bed, a careful watch will be kept on the young seedlings for any sign of variation and all variable types and those with twisted roots will be discarded at the time of planting out in the nursery rows. A further selection will be made before budding, and any of the trees which have developed a tendency to variation since planting out in the nursery will also be discarded.

At the time of budding only plump well formed buds from mature wood will be used and such buds will only be taken from trees which have been under observation for quality and production.

A portion of the nursery section at the Central Experimental Farm is to be set aside for the production of the experimental trees and the land upon which the actual trial is to be planted will be put down to crops which will enable uniform cultivation and manuring to be carried out on it during the years prior to planting. Wind-breaks for the trial plots are being established, so that they will be commencing to give protection by the time the trial is planned in the spring of 1938. B.J.W.

Apoplexy or Vine Stroke.

BY P. ANTONIADES, *Viticulturist and Wine Expert.*

IN the early summer of this year cases of apoplexy or stroke of the vine were observed to occur on a larger scale than in former years. The symptoms of this condition present similar characteristics of apoplexy of the vine known in France as "Maladie de l' Esca" or "Apoplexie" and in Greece as "Polyporiasis" or "Iska". This condition is brought about in Cyprus vineyards when the vine evaporates moisture at a greater rate than the moisture is being absorbed from the soil. This usually occurs when a dry and hot early summer follows cool and rainy weather, as was the case this year.

The first indication of an attack is a wilting of the tips of the shoots and leaves. This wilting may be observed on a part of the whole of the vine and the parts so affected die off. Vine growers were alarmed at the number of vines so affected this year and many specimens were submitted for identification and advice as to treatment. Vigorous vines are more badly affected as these have a greater evaporating surface, this condition also frequently occurs in vines planted on land where the sub-soil is damp in spring and the water table falls rapidly in early summer.

The condition appears sporadically and not in epidemic form, once it appears unfortunately no treatment can be recommended but measures suggested as a preventive are, to drain the soils of vineyards where the sub-soil is wet and affected vines which have died should be uprooted and replaced by new ones. Partially damaged vines where the wilting has not advanced too far should have all the dead wood carefully pruned during winter or pruning time. The damaged wood should be cut up to the live part of the stem. The cut stem should be treated with a solution of tar so as to prevent the entry of any fungus disease which may cause the decay of the whole plant.

Statement showing production of Silk Cocoons and Silk during the year 1934.

Districts.	Quantity of cocoons purchased by merchants	Quantity of cocoons used for silkworm egg production	Quantity of cocoons spun into thread	Quantity of cocoons reeled	Quantity of silk produced	Total production of cocoons
	okes	okes	okes	okes	okes	okes
Nicosia	1,686	630	382	13,099	1,589	15,797
Larnaca	195	—	1,223	6,591	849	8,009
Limassol.. ..	857	51	81	2,727	354	3,716
Famagusta ..	327	80	700	20,772	2,397	21,879
Paphos	15,995	34	4,336	11,523	1.397	31.888
Kyrenia	2,926	—	500	23,079	2,767	26,505
Total.. ..	21,986	795	7,222	77,791*	9,353†	107,794

* Includes 2,495 okes of cocoons reeled by the Cyprus Silk Filature.
† Includes 226 okes of silk produced by the Cyprus Silk Filature.

COMPARATIVE STATEMENT SHOWING TOTAL PRODUCTION OF SILK COCOONS AND SILK IN THE ISLAND DURING THE LAST SIX YEARS.

	1929 okes	1930 okes	1931 okes	1932 okes	1933 okes	1934 okes
Quantity of cocoons purchased by merchants ..	139,011	123,053	52,831	50,232	45,692	21,986
Quantity of cocoons used for silkworm egg production	2,274	1,891	1,179	1,132	1,130	795
Quantity of cocoons spun into thread	2,050	2,662	3,657	6,218	5,223	7,222
Quantity of cocoons reeled	71,806*	132,130†	93,573‡	116,595§	111,959§	77,791§
Quantity of silk produced..	13,828*	13,290†	11,525‡	13,671¶	13,390¶	9,353¶
Total production of cocoons	183,289	186,823	151,240	128,176	118,312	107,794

* Includes cocoons produced in 1928 and reeled by the Cyprus Silk Filature in 1929.
† Includes cocoons produced in 1929 and reeled by the Cyprus Silk Filature in 1930.
‡ All silk reeled by local reeling apparatus. Cyprus Silk Filature being closed for the year.
§ Includes cocoons reeled by the Cyprus Silk Filature.
¶ Includes silk produced by the Cyprus Silk Filature,

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

SEPTEMBER, 1934.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	90.37	64.03	–			0.27	– –
Athalassa		—		– –		0.58	– –
Morphou	88.86	60.96		–		0.18	
Makheras	– –	– –				0.20	–
Famagusta District :							
Famagusta	92.20	64.73				0.12	—
Akhyritou	88 90	64.40	–			0.19	–
Rizokarpaso ...	–	—				0.19	
Lefkoniko	– –	–				0.29	– – –
Larnaca District :							
Larnaca	91 70	66 30				0.40	–
Lefkara	–		0 90	3	0 72	0.62	
Limassol District :							
Limassol	88.53	63 87				0.02	– –
Saittas	—		1.13	3	0.83	1.82	– –
Trikoukkia... ...			0 08	1	0 08	0 85	–
Alekhtora	–					0 14	– –
Paphos District :							
Paphos	80.37	71.13				0.13	– – –
Polis...						0.27	– –
Kyrenia District :							
Kyrenia	91 40	67.36			–	0.29	—

OCTOBER, 1934.

District and Station	Maxim.	Minim.	Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	85 84	58.48	0.66	4	0.32	0.60	
Athalassa	—	– –	1.22	6	0.46	0.70	–
Morphou	82.42	57.80	1.23	4	0.85	0.34	
Makheras	–		—	– –	—	0.81	– –
Famagusta District :							
Famagusta	85.81	59.55	1.90	3	1.00	0.65	– –
Akhyritou	83.30	58.80	1.18	3	0.91	0.74	
Rizokarpaso ...			–	—	–	0.52	
Lefkoniko	– –	–	0.75	7	0.23	0.58	—
Larnaca District :							
Larnaca	84 90	64.50	1.93	3	1.12	0.86	– –
Lefkara	–		1.18	4	0.60	0.90	–
Limassol District :							
Limassol	82.90	60.55	1.22	2	1.16	0.66	–
Saittas	—	–	0.90	5	0.36	0.46	—
Trikoukkia	—	—	2.12	5	1.45	2.30	
Alekhtora	—	—	1.05	2	0.55	0.70	
Paphos District :							
Paphos	77.00	69.00	0.39	4	0.30	0.73	–
Polis...	–	—	1.67	4	0.64	0.89	– –
Kyrenia District :							
Kyrenia	81.10	63 44	2.19	7	0.60	0.70	–

***Note.*—Compiled from returns furnished by Public Works Department.**

NOVEMBER, 1934.

District and Station	Shade temperature Mean Maxim.	Minim.	Rainfall Total inches	No of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District:							
Nicosia	75.44	52.47	0.23	3	0.13	1.00	—
Athalassa	-		0.20	2	0.10	0.80	—
Morphou		- -		—	--	0.92	---
Makheras	- -		0.60	1	0.60	1.43	—
Famagusta District:							
Famagusta	79.50	52.87	0.23	3	0.15	1.50	
Akhyritou	74.80	51.10	0.27	3	0.22	1.24	—
Rizokarpaso ...		—	0.73	1	0.72	2.53	
Lefkoniko			1.43	3	0.79	1.11	- -
Larnaca District:							
Larnaca	77.50	55.77	0.79	3	0.50	1.65	—
Lefkara			1.35	4	0.90	2.43	—
Limassol District:							
Limassol	76.70	55.40	1.95	3	1.74	1.57	- -
Saittas	—	- -	0.88	5	0.40	1.85	—
Trikoukkia			1.02	4	0.47	1.58	-
Alekhtora	-		0.72	1	0.72	1.37	-
Paphos District:							
Paphos	67.17	61.73	1.25	4	1.12	1.85	-
Polis...	- -	-	1.09	3	0.57	1.60	---
Kyrenia District:							
Kyrenia	76.60	58.97	1.16	6	0.44	2.55	—

Note.—Compiled from returns furnished by Public Works Department.

Beef Transformed.

DOCTORS AND MATRONS INSPECT BOVRIL FACTORY.

NEARLY 6,000 Doctors and 1,000 Hospital Matrons accepted the invitation of BOVRIL LIMITED to visit and inspect their London Factory on 13th, 15th and 16th November.

Doctors and Matrons from every part of the British Isles—from Land's End to John O'Groats—attended. Even the remote Orkney Islands were represented.

The whole processes of manufacture were shown to the visitors, from the large pans each holding the concentrated juices of 300 Oxen to the familiar bottles, jars and tins which leave the Factory.

Hygiene is the keynote of the Factory. While fine cattle are being tended on up-to-date ranches in Australia and Argentina, and hundreds of employees are turning them into concentrated nourishment, white-coated chemists are constantly testing and analysing in laboratories behind the scenes.

The Matrons were welcomed by the Duchess of Atholl, and the Doctors by the Duke of Atholl. The Duke emphasized the modern, scientific methods by which Bovril is manufactured.

An interesting display of recent Medical films formed part of the programme.

VOL. XXX MARCH, 1935 Part 1

THE CYPRUS AGRICULTURAL JOURNAL

A Quarterly Review of the Agriculture, Forestry and Trade of Cyprus

Price THREE PIASTRES (4d.)

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THE

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Looking north from summit of Kornos (3,000 ft.) Kyrenia Range.

The
Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXX, Part 1 **MARCH, 1935** **Price 3cp.**

EDITORIAL NOTES.

THE situation from the point of view of production continues to improve. Good rains have fallen since the beginning of the year and conditions of growth of most crops are satisfactory. Natural herbage is plentiful in all areas and animals are in a satisfactory condition.

In certain areas there has been an excess of moisture to the detriment of cereals and the preparation of land for potatoes but the general conditions are good. Vines and the permanent crops such as cereals, olives and almonds will benefit greatly from the good rains after the effects of the previous three drought years.

* * * * * * *

CONFERENCE OF AGRICULTURAL OFFICERS.

A meeting of the Technical Staff of the Agricultural Department was held in January in the Lecture Hall of the Department. A series of meetings were held commencing on Monday, 14th January, of which the following was the programme :—

Monday, 14th, 2.15 p.m. ..	Opening and talk by Director of Agriculture.
Tuesday, 15th, 8.30 a.m. ..	Lectures and demonstrations by Entomologist and Staff.
Wednesday, 16th, 8.30 a.m. ..	Lecture and demonstrations by Manager, Stock Farm, including visit to Athalassa.
Thursday, 17th, 8.30 a.m. ..	Lectures and demonstration by Mycologist and Staff.
Friday, 18th, 8.30 a.m. ..	Lectures and demonstrations by Horticulturist and visit to Central Experiment Farm, Morphou.
Saturday, 19th, 8.30 a.m. ..	Final session.

Opportunity was given for general discussion of any points which officers wished to raise in connection with their work.

A Veterinary Staff course was also arranged by the Chief Veterinary Officer during the previous week for the Stock Inspectors and other officers of the Veterinary branch.

The Director of Agriculture and Mrs. Blunt arranged an At Home to the officers of the Department on Saturday, 19th January, after the Final Session of the Conference.

* * * * * * *

RETIREMENT OF MR. P. SYMEONIDES, INSPECTOR OF AGRICULTURE.

Mr. P. M. Symeonides, Inspector of Agriculture, retired from the Public Service on the 6th February, 1935, on reaching the age limit. Mr. Symeonides, who had been in the services of the Department of Agriculture since 1914, had a wide knowledge of local agricultural problems and he was entrusted with many responsible duties in the Department during his term of service.

* * * * * * *

RETIREMENT OF MR. M G. ZARIFI, M.B.E., REGISTRAR, CO-OPERATIVE CREDIT SOCIETIES.

Mr. M. G. Zarifi, M.B.E., retired from his duties as Registrar, Co-operative Credit Societies, on the 31st December, 1934. Mr. Zarifi, who was a well-known and respected Civil Servant, took charge of the Co-operative Credit Societies at their inception in 1926. Prior to that date Mr. Zarifi had 44 years' service in the Cyprus Civil Service to his credit.

Mr. Zarifi's successor as Registrar is Mr. B. J. Surridge, Commissioner, Larnaca.

* * * * * * *

CHIEF GRADER AND INSPECTOR OF PRODUCE.

Mr. F. B. L. Butler, Chief Grader and Inspector of Produce, assumed his duties on the 1st February, 1935. Mr. Butler, who was Grader and Inspector, Agricultural Department, Kenya, will be in charge of the grading and inspection service recently reorganized in Cyprus.

* * * * * * *

AGRICULTURAL LEAFLETS (EDUCATIONAL SERIES).

A new series of Agricultural Leaflets is in course of preparation. These Leaflets will deal with all the main agricultural crops and products of Cyprus. The primary object of this series of Leaflets is to supply schoolmasters with the necessary information for teaching agriculture in rural schools. Some of the more important Leaflets will be published in the first instance in the Journal and reprinted for circulation. This series should prove useful for farmers and others interested in the agriculture of Cyprus as well as for schoolmasters.

VILLAGE AGRICULTURAL SOCIETIES.

Many new Agricultural Societies are being formed in village centres. These Societies are formed with the object of improving the agriculture of the particular village in which the Society is organized, for arranging lectures and demonstrations to their members and in many other ways promoting agricultural progress. Such a Society, recently inaugurated at Xylotymbou village, has enrolled a membership of over 50 farmers.

PRIZE TO BE GIVEN BY THE OLD STUDENTS CLUB TO THE BEST AGRICULTURAL SOCIETY OR AGRICULTURAL CLUB.

At the Annual General Meeting of the Old Students Club held on the 15th January, 1935, a motion was passed agreeing to present a prize to an Agricultural Society or Agricultural Club. The prize will be awarded to the Society or Club showing the most activity from the agricultural standpoint during the year. A Central Committee will award the prize. The award will take the form of a cup which will be competed for annually.

ORANGE DAY CELEBRATIONS AT FAMAGUSTA.

An "Orange Day" was held at Famagusta on the 13th January, 1935, with the object of stimulating interest in production and local consumption of this fruit. The arrangements for the celebrations were made by Mr. Panaretos, Agricultural Officer, Famagusta, and a representative Organizing Committee was elected from members of the Municipal Corporation, various Famagusta Clubs and merchants and growers of Famagusta.

The programme included a memorial service at St. Nikolas Church, Varosha, parades of school children and lectures by schoolmasters, lectures by Medical Officers and an exhibition of Greek Dancing at Haji Hambi's Theatre.

Sports were held in the afternoon and an orange party was held at "Anorthosis" Club.

Oranges and orange juice were freely dispensed to all those attending any of the items on the programme of events and from well arranged and decorated stalls placed at various points in the streets.

The "Orange Day" was most successful and reflected great credit on the organizers and those who kindly took part in the various events arranged for the day.

EXPORTS OF CITRUS FRUITS.

Up to the 15th February, 1935, the shipment of oranges to the United Kingdom this season was 44,959 boxes as compared with 43,623 boxes for the same period during the previous year.

20,892 boxes were exported to Northern European countries this season as compared with 16,300 boxes last season, for the same period.

The arrangement made by importers for shipping and stowage of the fruit on board ship have been far from satisfactory this year. Some of the steamers loading oranges at Cyprus ports for shipment to London without transhipment at Port Said have taken too long on the voyage.

The proportion of large-sized coarse oranges is also high this season and these are not desired in European markets.

CYPRUS TOBACCO STOCKS.

According to the Port of London Authority Official Dock Reports the total quantity of Cyprus Tobacco Leaf withdrawn from Bond for manufacture during the year 1934 amounted to 200,000 lbs. (say 70,000 okes) leaving a balance of 1,141,000 lbs. (say 400,000 okes) in their Bonded Warehouses at the 31st December, 1934, or nearly 6 years' provision on the basis of last year's deliveries.

The quantity of the 1934 crop tobaccos, composed of Yellow Leaf and Fumigated Latakia still available in the Island is estimated to be around 300,000 okes.

SILKWORM REARING IN GIRLS' SCHOOLS.

The Agricultural Department has supplied one dram of silkworm eggs to each of 122 girls' schools where rearing of the silkworms will be carried out by the elder girls under the supervision of the mistresses. Visits will also be paid to the schools by the Sericultural Officers of the Department to give further instruction.

SILKWORM EGG PRODUCTION.

Licences have so far been issued to 21 rearers to enable them to produce silkworm eggs during the 1935 season. This is a decrease of 6 compared with 1934, but it is anticipated that one or two further licences will be issued.

The amount of silkworm eggs available for the 1935 season is 4,258 ozs. of which 2,958 ozs. was produced locally and 1,300 ozs. was imported.

This amount of seed is the smallest which has been available for many years and is less than the quantity actually used in 1934.

The seed was hibernated at Pedhoulas and was removed from hibernation on 20th February, 1935.

BEAN APHIS.

Owing to the satisfactory rainfall during the winter considerably larger areas were sown with broad beans than has been the case during the last two or three years, and as usual the beans were badly attacked by aphis and a considerable amount of spraying has had to be done to protect the crop.

FUNGUS DISEASES.

The present season has been exceptionally favourable to fungus diseases. There are already indications of the possibility of serious and widespread epidemic. At the time of going to press the barley and broad bean crops are the chief sufferers. Powdery mildew of barley is prevalent in all districts and may do serious damage before the dry weather sets in. Much of the withering of the outer leaves of the young plants is caused by the fungus known as *septoria passerinii*. Leaf Stripe and Net Blotch, caused by species of the fungus *Helminthosporium*, has already been seen in many fields.

The prevalence of diseases on cereals generally in a season such as the present one emphasizes the necessity of treating seed corn before sowing. Many diseases are carried in or on the seed which produces a few diseased plants. These are a source of infection and in a favourable season may start an epidemic.

It is necessary to issue a warning to vine growers that there is a likelihood of an outbreak of " Peronospora ". Weather conditions, so far have been similar to those experienced in 1931 when a widespread epidemic of " Peronospora " occurred. If favourable weather conditions continue into the late spring it will be advisable to carry out routine spraying with a copper fungicide. Home-made Bordeaux or one of the proprietory spray mixtures may be used. Full particulars of the method of making Bordeaux Mixture and the application of the spray is given in the Department's Leaflet No. 16 " Peronospora of the Vine ". If the disease makes its appearance all growers should at once spray their vines. If it is desired to spray at the same time with lead arsenate against *Eudemis* the lead arsenate powder may be added to the Bordeaux in the usual proportion used in spraying, *i.e.* 12½ drams to 10 okes of Bordeaux Mixture.

Wastage of citrus fruits in transit this year has been greater than in the previous seasons. The fungus responsible is the " green mould ", which is all too common on fallen fruit in the Cyprus groves. It is known that this fungus can only attack fruit, the skin of which is broken by careless handling or by rubbing. Owing to the prevailing wet weather the skin of the oranges is exceptionally tender and very little pressure is needed to burst the fine skin of the oil cells. Once these are ruptured the fruit is readily attacked by the fungus. Special care must be taken this season to see that the fruit is not bruised or scratched during the picking and storing before wilting has been effected. All fruit should be clipped a second time to ensure that no portion of the stalk projects in contact. The worker's finger nails must be kept short and the wearing of gloves might be considered as a practical proposition.

THE AGRICULTURAL RESOURCES OF CYPRUS.

The Effect of Natural and other Factors on Development.

BY A. PITCAIRN, *Assistant Director of Agriculture.*

THE geographical situation of Cyprus is in the Eastern Mediterranean between latitude 34° 33′ and 35° 41′ North, and the type of climate which prevails in the Island is somewhat similar to that of most of the other countries in the Levant, namely intense heat with practically no rains during the summer months and low average rainfall during the winter months with snow in the mountains and liability to periodic droughts, light winter frosts and occasional snow in the lower regions.

The mountains of Cyprus reach a height of over 6,000 feet and the topographical features of the Island permit a wider range of climatic conditions during the winter and summer seasons than is found in some of the neighbouring countries. There are many temperate and sub-tropical crops and as the resources of the Island are essentially agricultural, the rural communities which are established over the whole of the Island, except on the forest reserves, produce the commodity most suited to conditions of their area but distribution of the crops grown is mainly determined by the natural features of temperature, rainfall and soil. Besides these natural features there are questions of irrigation, land tenure, credit and markets, which affect the extent to which the various crops are grown in the particular area of the Island and suited to them.

Although the natural features allow a very wide range of temperate and sub-tropical crops the cold winters and frosts preclude the production on a commercial scale of purely tropical crops and some sub-tropical crops yet bananas and other tropical fruits can be grown in certain sheltered places on the coast.

The soil and climatic conditions of Cyprus are typically Mediterranean in character and eminently suitable for the production of the various crops and products of that region amongst which of special mention are carobs, olives, vines and citrus. In the plains, arable farming is practised and winter, spring and summer crops are grown with or without irrigation. These crops include : wheat, barley, oats, cotton, flax, hemp, sesame, tobacco, potatoes, onions, broad beans, vetches, cowpeas, haricot beans, favetta, cumin, aniseed and various vegetables. Almonds are grown in the drier parts and deciduous and other fruits in various parts of the mountains and plains.

Animal husbandry forms an integral part of the agricultural activities of the farmer and the classes of animals kept are cattle for draught purposes and for export ; horses, mules and donkeys for transport work and export ; sheep and goats for meat and dairying besides pigs and poultry. Natural grazing is poor and certain fodder crops are produced such as maize and lucerne, to supplement the natural pastures. Other resources of importance are sericulture, apiculture, production of essential oils and the collection of sumach.

The agricultural activities may be broadly grouped under the headings of Viticulture, Horticulture, Arable Farming and Animal Husbandry.

The above outline indicates the reason why the agricultural production is so diverse in character in so limited an area, as the extent of the Island is some 3,583 square miles. The following notes are intended to show the effect of these various factors on the agriculture of the country.

TEMPERATURE.—The mean maximum and the mean minimum temperatures of the Island for 15 years during the period 1919 to 1933, were 78° and 54° 6′ F. respectively. The mean temperature for the same period was 66° 3′ F., which indicates that the Island falls within the Isotherms of the warm temperate zone.

The difference in temperature between Nicosia and Troödos, the highest recording station in the mountains during the four hottest months in the year 1934 was :—

	Nicosia °*F.*		*Troödos* °*F.*	
Month	*Mean Max.*	*Mean Min.*	*Mean Max.*	*Mean Min.*
June	93.90 ..	65.60 ..	74.63 ..	55.16
July	98.29 ..	70.19 ..	79.80 ..	59.35
August	97.17 ..	68.87 ..	79.67 ..	60.06
September ..	90.37 ..	64.03 ..	72.93 ..	53.03

There are no great annual variations in temperature from year to year but the temperature in Cyprus concerns, to a great extent, the method of farming practised in the plains. As Cyprus falls within the Isothermal zone for warm temperate and sub-tropical crops, the planting of crops such as cereals, potatoes, vetches, broad beans and flax are arranged so that they are harvested in the spring or early summer before the extreme high temperatures of the hottest summer months. Two crops of potatoes are grown · one planted in January and February and harvested in May June and the other planted in July and harvested in November–December.

Crops such as tobacco, cotton, sesame and maize are planted in late spring or early summer and harvested before the first winter rains in October and November. The time of planting and time of harvesting of the annual crops are strictly limited owing to the consistency of the annual month to month temperature and it is essential that winter crops should be planted sufficiently early to allow the full growing period before premature ripening occurs and similarly with the spring and summer crops, before the advent of autumn conditions.

Late frosts which may occur in February and March are liable to cause damage to citrus during the blossoming period.

In the hill regions the agricultural activities are mainly confined to viticulture and horticulture but the difference in temperature of the plains with that of the mountains during the summer months permit the cultivation of a succession of various vegetables throughout the year.

RAINFALL.—Although the yearly variations in temperature are fairly constant the annual rainfall is extremely variable from one year to another and there is also a marked variation in different areas in the same

year. The average annual rainfall for forty years from 1894 to 1933 was 19.19″ but so far as agriculture is concerned the two important rainfall considerations modifying the agricultural practices of the Island are :—

(*a*) Seasonal distribution,

(*b*) Rainfall zones.

The seasonal distribution is practically the same throughout the Island. Normally rains commence in October, increase in November, are heaviest in December, January and February, and decrease during March and April and light rains may continue during May, while from June to September negligible quantities only fall. The following table shows the average rainfall from month to month at the stations of Nicosia, Famagusta, Trikoukkia, on the Troödos hills and Paphos, for the years 1925–1934 :—

Average Rainfall for 10 years, 1925–1934.

Month	*Nicosia*	*Famagusta*	*Trikoukkia*	*Paphos*
	inches	*inches*	*inches*	*inches*
January	3.83	4.91	6.68	4.97
February	3.01	3.47	5.28	4.31
March	0.68	1.09	3.47	1.66
April	0.53	0.70	2.48	1.00
May	0.86	0.46	0 94	0.38
June	0.21	0 24	0 42	0 14
July	0.07	0.07	0.11	0 04
August	0.09	0.05	0.09	0.05
September	0.27	0.12	0.85	0.13
October	0.06	0.65	2 30	0.73
November	1.00	1.50	1.58	1.85
December	2.61	3 75	7.06	4.45
Total average	13.22	17.01	31.80	19.71

The rainfall zones may be grouped in three divisions :—

15″ and under zone which roughly covers the Mesaoria plain and certain coastal regions which constitute the main arable farming and citrus areas of the Island.

15″ to 25″ zone which includes the northern range of hills in Kyrenia District, the Karpas and the foothills of the southern range in which area vines, carobs, olives and deciduous fruits and nuts are grown.

25″ and over zone mainly delimited as forest reserves.

The annual crops are practically all produced in the 15″ and under zone and although the seasonal distribution is usually sufficient for the production of winter crops, crop failures frequently occur, if irrigation water is not available. Irrigation is required for the production of summer crops, fodder crops and citrus, therefore, irrigation is of vital importance to Cyprus agriculture.

Owing to the topography of the Island, the dry state of the land and nature of precipitation after a long dry season, a considerable amount of erosion and loss of value of the rainfall takes place annually by rapid

running off of rain water to the sea through the many watercourses. Every effort is made to utilize this silt-laden water for irrigation by means of diverting the flood waters over the agricultural land. Much of this loss is prevented in the forest reserve water catchment areas, but much more could be done by more terracing of agricultural lands. As the winter season advances the moisture content of the soil increases and this loss is considerably lessened, except in times of exceptionally heavy rains.

Hail storms usually occur in spring and early summer. The worst hail storms are experienced in the hill regions but severe damage sometimes occur in the plains, the damage done is very localized and fruit trees usually suffer most from the effect of these storms.

In the mountains snow often lies for fairly long periods during winter and spring at an altitude of over 5,000 feet, below this altitude snow seldom lies for any length of time and in the plains a fall of snow is a very rare occurrence.

SOILS.—No soil survey of Cyprus has been carried out from which the correlation of crop distribution with soil classification could be made, but there is sufficient data available from the various investigations on the geology of Cyprus, the work carried out by the Department of Agriculture on soils and various publications referring to Cyprus soil, from which a general description of Cyprus soils and their relation to farming practices can be given Although the effect of soil on agricultural development is not so vital as that of temperature and rainfall, there are certain characteristics of soils in Cyprus which have a considerable bearing on production.

* Professor C. G. Cullis in referring to the geology of Cyprus stated: "The geology and economic minerals of Cyprus are remarkably varied. Both sedimentary and igneous rocks are present the former occupying about four-fifths of the Island, the latter one-fifth. The sedimentary rocks range from Cretaceous to Recent ; the igneous are generally supposed to belong to one period, viz., Miocene."

The above reference to the geology of Cyprus is given as an indication of the rock formation from which the soils originate.

The results of the various laboratory soil analyses, made by the Agricultural Chemist of the Department of Agriculture, indicate that Cyprus oils contain a low percentage of phosphates. This deficiency accounts, to a great extent, for the tendency of the Cypriot farmer to use a compound artificial fertilizer containing phosphate in preference to a straight fertilizer.

The main types of Cyprus soils fall within the classification of loamy, calcareous, sandy and rocky soils.

In the plains large areas of the surface at one period consisted of pliocene and pleistocene crusts which, to a great extent, have eroded and thus formed the rich arable lands of the Mesaoria. These soils

* A sketch of the Geology and Mineral Resources of Cyprus by Professor C. G. Cullis, "Journal of the Royal Society of Arts," No. 3761 of 1st August, 1924.

have been considerably enriched with alluvial deposits of silt carried on to the land by flooding during the winter rains.

Indications of the original pliocene surface are seen in those low flat topped hills which are characteristic of the neighbourhood of Athalassa, near Nicosia, and by the stretches of infertile land known as "Kavkalla." "Kavkalla" is seldom cultivated as it mainly consists of crumbly limestone and this type of land is usually referred to as Hali land or waste land of which there are considerable areas in the Island and is grazed over by sheep and goats and in some parts covered with scrub forest growth.

In many areas of the plains the soil consists of a typical Mediterranean Red soil which forms fairly extensive areas of some of the more progressive agricultural districts. These soils are considered to be formed by the weathering of sedimentary rocks and the following extract from the "Empire Journal of Experimental Agriculture" referring to this type of soil is quoted :—

> "Typical *terra rossa* is found only here and there on the Island. It appears to occur most widely in the Mesaoria plains, where there are outcrops of pleistocene, or pliocene, limestone and marl ; and it can be seen from the Nicosia-Morphou railway predominating everywhere up to the slopes of the Troodos mountains. A sample taken from there, lying on pure limestone, had the typical composition found in Palestine and other Mediterranean countries. We also saw typical *terra rossa* on the south, *e.g.* near Limassol (Ypsonas) and it predominates between Kouklia and Famagusta. Further the oligocene, marls and limestones of the Kyrenia mountains are in places weathered to *terra rossa*, although here the red colour is changed by humus to a dirty brownish red.
>
> Generally, the limestones and marls of the plain weather to a greyish brown chalky loam which, in our opinion, is due to the aridity of the Cyprian lowlands."

Sandy soils are mainly found near the sea along the shores of Famagusta Bay and Morphou Bay. In certain sections of these Bays and other parts of the coast, protective measures have been taken to prevent the formation and spread of sand dunes. From the centres of Famagusta, Lefka and Morphou the citrus growing industry is rapidly developing on the light sandy loams and red loams of these areas.

Most of the vine-growing villages of Paphos, Limassol and Larnaca Districts follow a belt of calcareous soils found on the southern and western slopes of the Troödos range. In the fertile valleys of the northern and eastern slopes of the Troödos range, rich loamy soils are formed and deciduous fruit growing is successfully practised on these soils.

Varied conditions are more the rule than the exception in Cyprus. Stretches of loams, calcareous and sandy soils are found intermixed in different parts of the Island and crops especially such as citrus are grown successfully in extensive areas in districts other than those mentioned. Vines are also grown on other than purely calcareous soils from those

* Investigations of Soil Profiles from Cyprus. A. Reifenberg and Elinor K. Ewbank. The "Empire Journal of Experimental Agriculture," Vol. I, No. 1, April, 1933.

characteristic of the well-known "wine villages" near the centres of Omodhos, Kilani and Vasa.

IRRIGATION is essential for the development of the Island, in fact without irrigation, production would be extremely limited and the agricultural requirements necessary to support the existing population and live-stock would not be met. There are several systems by which water is made available by the farmers, village communities, or under Government control, for irrigation purposes :—

(1) Exploitation of the limited number of perennial springs now in existence, such as the Kythrea spring.

(2) Irrigation from mountain springs of the Troödos range, such as is carried out in the Solea and Marathasa valleys.

(3) Establishment of chains of wells by linking up a number of wells underground and bringing the water to the surface in an open channel.

(4) Raising the water by animal or power machinery from wells.

(5) Irrigating the land by silt-laden flood water.

(6) Irrigation from Government controlled storage reservoirs.

Areas irrigated by perennial and mountain springs are strictly confined to the particular areas within reach of these springs and the capacity of the spring, but it is possible that many more valuable sources of such water await discovery The project for utilizing the newly-found water supply at Sykhari, as a supply for Nicosia township, indicates the possibilities in this respect.

The making available of irrigation water by chains of wells is a wasteful system and one which should be discontinued for the more satisfactory system of pumping water from the wells.

The utilization of silt-laden flood waters is a very beneficial practice and one which is exploited by the farmers wherever the topographical features permit.

Large scale storage irrigation schemes have not been successful, but there are possibilities that this system may yet prove successful on a modified scale for the irrigation of cotton and other summer crops. The trend of the agricultural progress of the Cypriot farmer under existing conditions indicates that the further exploitation of the available water by small pumping installations on private land would lead to successful development.

LAND TENURE.—The laws in force for the tenure of land are those which were in operation during the Turkish rule in Cyprus. A number of amendments have been enacted since the British Occupation but the main features of the original laws still remain and the position with regard to agricultural holdings is as follows :—

Practically all the land is the property of the State and is known as *Arazi Mirié* or State lands. Ownership is held under a *kochan* or title-deed and all land so held is subject to a land tax and an educational tax. The title-deeds and taxation are arranged by the Land Registry Department of the Government. Any land remaining uncultivated for a period of ten years is liable to revert to Government. The land can be sold or mortgaged but all sales and mortgages must be transacted through the Land Registry Office. The Cypriot owner cannot arrange

for the disposal of his property by will as this is controlled by the law of inheritance. Under the original Turkish laws, provision is also made whereby certain immovable property consists of buildings and trees standing on land of a separate owner. Other categories of land of importance to agriculture are *Merra* or village pasture land and *Hali* or waste land ; special conditions apply to such land, the most important of which is the provisions whereby *Hali* land can become *Arazi Mirié* and be used for arable farming.

Most of the land is owned and farmed by the village farmers but there are certain number of chiftliks or estates and large properties belonging to the various monasteries and a number of villagers lease agricultural land from the monasteries and other parties at a fixed rent.

The system of two parties contracting, whereby one party gives the seed and lands, animals for cultivation and the other party owning the land provides the labour and pays for the hire or keep of the animals and both parties agree to the division of the resulting crop is practised in a number of villages. The actual details of the arrangements may vary according to crop and district.

With such a complex system of land tenure and the existing law of inheritance, the continual sub-division of holdings and in certain cases share in trees where a separate title is held for trees independent of the land has resulted in many cases in individual holdings becoming too small and sometimes too scattered for economic working and every opportunity should be taken to consolidate the holdings.

The type of arable farming has resolved itself into cereal production alternating with fallow and summer crop, if irrigation water is available. The land is becoming impoverished but with a consolidation of holdings it would be possible to improve the rotation and thus improve the land.

AGRICULTURAL CREDIT.—Agricultural credit has a direct bearing on the prosperity of a peasant farming community. When the farmer becomes completely burdened by debts from which he is unable to free himself, as unfortunately is the state of affairs in Cyprus, he loses heart and takes little interest in his holding unless by force of necessity.

Co-operative Credit and Co-operative Societies and facilities offered by an Agricultural Bank have been organized in the Island and are designed to assist the farmer, and this aspect of agricultural development is one of significant importance and one which when the farmer fully realizes the value of co-operation will have far-reaching results in placing the agriculturists on the road to prosperity.

MARKETS.—In the past Cyprus has been in the fortunate position of easily marketing its surplus products in the neighbouring countries of Egypt, Greece, Palestine and Syria. Owing to world economic conditions, considerable changes have rapidly taken place in recent years and it is no longer possible to market produce readily in any of the countries mentioned above either on account of restrictions on imports in these countries or by competition from other producing countries. This has necessitated a search for new markets, but in order to retain some of the old markets and to develop the new markets it is necessary to ensure that the quality of the produce is of the standard required by the

particular countries where markets are found and also able to compete with other countries producing the same commodity. Two important considerations in this respect are the grading and inspection of produce before export and facilities for the transportation of the produce to the overseas markets. In order to deal with the former consideration the produce inspection service organized by the Department of Agriculture has been created. The latter consideration can only be adequately dealt with when the quantity and quality of the produce justifies special facilities.

SUMMARY.—Owing to the geographical position of Cyprus the topographical features and the geological formation there is a wide range of soil and climatic conditions which are suitable for many temperate and sub-tropical crops.

The seasonal distribution of the rainfall in the plains is usually sufficient for cereal production, but insufficient for the production of summer crops without irrigation. Irrigation water is also necessary for the rapidly developing citrus growing industry and for the production of fodder crops and improvement of the animal husbandry industry

Agricultural holdings require to be consolidated to permit better farming practices which would lead to more uniform quality of produce and increased production.

When farmers more fully understand the use of agricultural credit instead of its misuse, more progress in the marketing of produce will be made.

Further improvements in quality and quantity of produce would be made if more attention was given to —

(*a*) The type of implements used.

(*b*) Selection of seed for planting.

(*c*) Control of pests and diseases.

(*d*) Application of the necessary cultural operations for the particular crop being grown.

Many areas are also planted with crops under conditions in which it is unremunerative to grow such crops. In Cyprus this particularly applies to cereal production where land is planted with wheat and barley which would be more profitably grown under olives and almonds.

Plant Quarantine Stations.

WITH the publication of the Regulations of the Plant Quarantine Station in Trinidad in the January number of "Tropical Agriculture", attention is focussed in the editorial of the importance of this station to the West Indian Group of Colonies and the danger which exists under modern conditions of transport, if introducing serious pests and diseases on living plants and plant products.

Though Cyprus possesses as yet no Quarantine Station, the Department of Agriculture is fully alive to the danger of new pests and diseases gaining a footing in the Island. Indeed, with the great diversity of temperate and sub-tropical crops, Cyprus, possibly more than any other Colony, is liable to suffer severely should some of these undesirable aliens succeed in establishing themselves. Moreover considering the proximity of the neighbouring countries, where pests and diseases unknown in Cyprus exist, it speaks well for the vigilance of the officers of the phytopathological service that cultivated crops in Cyprus enjoy so clean a bill of health.

The phytopathological service, consisting of entomological (insect pests) and mycological (fungus diseases) sections, working in close co-operation with the Customs and Postal authorities, examine all plant material imported into the Island. Even when permission is given to import, the plants are generally placed "in quarantine" and are frequently inspected during the first year of growth so that, should any pest or disease break out immediate steps can be taken to treat or destroy the whole consignment. A no less important function of the service is the inspection of consignments of plants and plant products before export so that the health certificate required by the authorities of the importing country, can be given. A copy of the certificate which must be obtained by all persons, importing plants into Cyprus, is reproduced for general information below.

The subject very closely concerns all engaged in agriculture and is considered of such interest that the article on Plant Quarantine Stations in "Tropical Agriculture" is here reprinted.

PLANT QUARANTINE STATIONS.

(*Tropical Agriculture, Vol. XII, No.* 1, *January*, 1935.)

The danger of introducing serious pests and diseases on or in living plants or plant products has been realized for many years in numerous countries. And in order to minimize this danger protective measures in the form of inspection at the port of entry is in force in most of the agricultural countries of the world. But in spite of the conscientious surveillance of the officers of the plant protection services a number of sharp lessons have shown that such precautions, although extremely helpful and essential, do not adequately protect a country from the introduction of pests and diseases. Numerous instances of such leakages are known which have caused serious dislocation of trade over extensive territories and the expenditure of large sums of money before the evil effects have been brought under control. In this respect the history of citrus canker (*Phytomonas citri*) in the United States of America and in South Africa is of interest. This destructive disease appears to have

been introduced into Texas, Mississippi, Alabama and Florida on both seedling trees of Trifoliate Orange (*Poncirus trifoliata*) and on Satsuma orange trees shipped from Japan in 1911. It was not recognized as a serious menace in these States until 1914 and since its symptoms are somewhat similar to those of scab disease caused by the fungus *Sporotriclum citri*, its true cause was not known until 1915 by which time it had become widely spread. Similarly citrus canker was introduced into the Union of South Africa on shipments of citrus trees from Japan. The most recent reports show that the disease has now been eradicated both in the United States and in South Africa but this has only been possible after putting into effect the bold, expensive, but nevertheless effective, and economic policy of completely destroying citrus trees within affected areas. The cost in each case has run into millions of pounds sterling.

Different species and varieties of citrus differ markedly in their susceptibility to canker and this fact coupled with wide variation in climatic conditions in different countries makes the disease a most serious one in some citrus-growing countries and of comparatively little importance in others The Tahiti lime, though not completely immune, is very resistant to canker disease so that it does not develop on this host except to a very mild extent. At the other extreme, grapefruit (*Citrus maxima var. uracarpa*) is extremely susceptible and a medium position in this respect is taken by limes (*C. aurantifolia*) and sweet oranges (*C Sinensis*). It is evident, therefore, that though the Tahiti lime is itself highly resistant it can still effectively function as a carrier of the disease to the more susceptible varieties of citrus Moreover, it would be extremely difficult, if not impossible, for an inspecting officer at the port of entry to diagnose inconspicuous lesions of citrus canker on plants of Tahiti lime and some other citrus varieties It has, therefore, become necessary to adopt fuller and more effective measures to minimize still further the ravages of such dangerous plant parasites.

For this purpose several countries demand that a certain form of health certificate, signed by a competent authority, should accompany each consignment of specified plants or plant products which states that certain prescribed conditions have been fulfilled. At the instigation of Mr. Stockdale, the Colonial Agricultural Adviser, a standard certificate was framed at the Third Imperial Mycological Conference, held in London last September, with the proposal that it be adopted for use throughout the British Empire. This certificate, which is incorporated in the regulations of the Plant Quarantine Station at this College, meets all contingencies since it provides also for the use, in exceptional circumstances, of an additional certificate or certificates to cover imports specifically scheduled by the importing country. In the case of the above quarantine station this additional certificate has taken the form of a supplementary clause. In addition to demanding certificates to cover large and commercial consignments of living plants and plant products steps have been taken in some countries, notably the British Empire and the United States of America, to establish plant quarantine stations through which all or specified plant material, destined to be used for propagation purposes, must first pass. This is particularly applicable to commercial crop plants but the fact that certain weeds and ornamental plants may be

alternative hosts to pests and diseases known to occur on certain crops is a matter of importance and is also taken into consideration. This aspect of the problem can be gathered from the regulations of the Plant Quarantine Station recently established at this College. The thought might occur to those inexperienced in such matters that the cheapest and most effective method of avoiding the introduction of harmful crop parasites would be by means of legislation completely prohibiting the importation of new varieties. That such a measure if carried out would be the most effective of all is obvious but it is perhaps advisable to stress that such legislation would be unsound from several points of view. Prohibitive legislation stimulates into action the adventurous or rebellious natures of a number of people with the result that they, though otherwise law-abiding, would run grave risks to themselves and others in their endeavour to circumvent the law. The results of the law prohibiting the sale of alcoholic beverages in the United States of America is sufficient proof of this. On the other hand, the very reason for the introduction of new species and varieties of crop plants in a country is, in many cases, due to the fact that the existing crops in that country have proved uneconomic because of the serious damage caused by pests and diseases which have been previously introduced or are indigenous. Moreover, important as some plant parasites have proved, several other factors such as the demand for better plant food for both animals and human beings, as well as other national and economic considerations make the importation of new plants not only desirable but also essential In the past, botanical gardens have been established in various countries with a view to establishing a source of supply of successfully grown crop and ornamental plants. And there is no gain saying that, although these gardens have admirably served this purpose in the past, the lack of adequate quarantine measures has resulted in their serving also as a ready source for the distribution of many pests and diseases.

The pioneers of plant quarantine work, at least within the British Empire, and probably in the world, have been the authorities of the Royal Botanic Gardens at Kew in England. Crop and ornamental plants have been collected at Kew from all parts of the world and it would be no exaggeration to say that, after a period of quarantine, such plants have been distributed almost equally widely. In addition to the quarantine facilities available at Kew it has become evident in recent years that other quarantine services and stations are necessary in order adequately to safeguard modern agricultural industries. Two such quarantine stations have recently been established in the Colonial Empire, namely, one at the Imperial College of Tropical Agriculture, and the other at the Amami Research Institute in Tanganyika. The station in Trinidad serves the British West Indian possessions and the Central Quarantine Station at Amami will function for the colonies and mandated territory of East Africa.

In respect of protective measures against the distribution of plant pests and diseases, group arrangements have been made between Canada and the United States, and between the Union of South Africa, Southern Rhodesia, Northern Rhodesia and the Belgian Congo. Proposals have also been made for uniform plant protective legislation for the West African Colonies.

On completion of the building of the Plant Quarantine Station for the British West Indian Colonies the Plant Quarantine Committee decided that it was desirable for its secretary to visit Washington, with a view to formulating a scheme of co-operation whereby an exchange of plant material, which had been passed through the respective quarantine stations, could be made between the British West Indies and the United States Department of Agriculture with the minimum possible danger of introducing diseases and pests into either territory. As a result of this visit relations have been placed on an excellent footing and there is no doubt that this example will be followed by other countries and that the fight against economic plant diseases and pests will be sanely viewed as an international problem which requires close international co-operation and surveillance.

Health Certificate required by the Department of Agriculture, Cyprus, for plants, fruit, etc., imported into Cyprus, but previous permission from the Director of Agriculture is required .—

CERTIFICATE OF EXAMINATION OF PLANTS, ETC., FOR EXPORT TO CYPRUS.

(Official Name of the Inspecting Service).

This is to certify that the living plants or plant products / a representative sample of the living plants or plant products included in the consignment of which particulars are given below were / was examined at..............................

on the......................*(date)* by me....................

....

(Name and position and address of authorized official.)

a duly authorized Inspector, who was unable to discover any evidence of any injurious insect pest or plant disease, in particular of the following pests and diseases :—

INSECTS.—*Phylloxera vastatrix*, Planch.—*Eriosoma lanigerum* (Hausm).—*Aspidiotus perniciosus*, Comst.—*Diaspis pentagona*, Newst.—*Chrysomphalus aonidum*, L.—*Pseudococcus comstocki*, Kuw.—*Lepidosaphes ulmi*, L.—*Lepidosaphes gloverii*, Pack.—*Lepidosaphes beckii*, Newm.—*Chionaspis furfura*, Fitch.—*Saissetia oleæ*, Bern.—*Icerya purchasi*, Mask.—*Icerya ægyptiaca*, Douglas.—*Aleurodes citri*, Ashm.—*Heterocordylus malinus*, Reut.—*Lygidea mendax*, Reut.—*Leptinotarsa decemlineata*, Say.—*Anthonomus grandis*. Boh.—*Conotrachelus nenuphar*, Herbst.—*Heliothis obsoleta*, F.—*Prodenia litura*, F.—*Malacosoma americana*, F.—*Malacosoma disstria*, Hubn.—*Cydia molesta*, Busk.—*Epochra canadensis*, Lœw.—*Rhagoletis pomonella*, Walsh.—*R. cerasi*, L.—*R. cingulata*, Lœw.—*R. Fausta*, Osten Saken.—*Iridomyrmex humilis*, Mayr.

FUNGI.—*Plowrightia morbosa*, Saac.—*Bacillus amylovorus*, Frev.—*Endothia parasitica*, (Murr.), And. and Ande.—*Synchytrium endobioticum*, Perc.—*Urocystis cepulæ*, Frost —*Peronoplasmopara humili*, Miy. and Taka.—*Bacterium tumefaciens*, Sm. and Towns.—*Sclerotium cepivorum*, Berk.

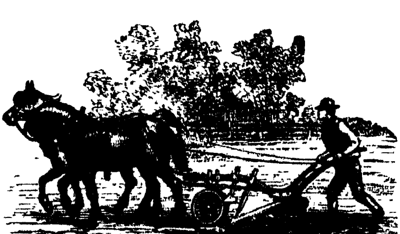
And that the consignment covered by this certificate $\frac{\text{has}}{\text{has not}}$ been treated (in the following manner, *e.g.*, fumigated with................ or disinfected with..

prior
immediately subsequent to inspection.

Date...................... (*Official seal*).

No. of Packages..
Distinguishing Marks..
Description of Plants or Plant Products............................
Stated to be grown at..
and inspected in the field on.......................... (*strike out latter portion if field inspection is stated not to have been made*).
Exported by..
Name and address of consignee..................................

Further information on the regulations concerning imports is given in Leaflet No. 20, issued free on demand.



The Breeding, Feeding and Management of Cattle.

BY J. P. MAULE, M.A., DIP. AGRIC., *Manager, Stock Farm.*

1. INTRODUCTION.

(1) Cattle are kept in Cyprus for 3 main purposes in the following order of importance :—

(*a*) For Working
(*b*) For Milking
(*c*) For Slaughter as Beef.

(2) The native cattle of Cyprus are used entirely in the first category, and there are 2 types of native cattle, (*a*) a large big boned breed found chiefly in the Messaoria, and (*b*) a smaller type found in the hilly region around Paphos and, to a lesser extent, in the Karpas.

(3) The milking cattle are nearly all derived from animals imported by the Government to the Stock Farm at Athalassa. This dates from 1907, although some bulls were imported previously without any apparent success. From 1907 animals have been continuously imported in order to encourage and improve the production of cows' milk in the Island. By holding periodic auction sales at Athalassa the progeny of the imported stock has become dispersed to many places in the Island, but mainly to the larger towns where there is a demand for cows' milk. It is not usual for the native cows to be milked but it is possible that cows crossed with imported bulls have been milked though they seldom give as much milk as the imported cows or cows derived from those imported to Cyprus.

(4) Animals that are not required for farm purposes or that are not fit for working form the third category, that is of beef animals. However, they do not really make good beef, and it is for this reason that there is not a better export trade in beef

It should, however, be possible by better methods of feeding and by breeding a better type of animal to improve this trade in beef in the future.

2. BREEDS OF CATTLE.

(1) Cattle breeding in Cyprus has aimed only at the two first objects enumerated above, namely to obtain working and milking cattle, and these two objects are quite distinct. There has, in consequence, been very little development or improvement in the working type of cattle, although it is possible that in some parts, especially in parts of the Messaoria, the native cattle have been crossed with pure-bred or half-bred bulls from Athalassa. Generally speaking, however, the native cattle are distinctly a breed of their own and familiar to all people in Cyprus.

(2) As stated at the beginning milking cattle, on the other hand, are derived mainly from imported cattle and the standard has probably improved considerably. The names of the imported breeds which have been introduced and their main distinguishing characteristics, are as follows :—

BREEDS OF CATTLE IMPORTED TO CYPRUS.

1. *The South Devon Breed.*—Imported from 1912–1921. These are light brownish-red in colour with rather curly hair and with horns curving forward. They are the biggest breed in England weighing from 500–600

2. *The Shorthorn Breed.*—Imported since 1920. They are red or roan or even white in colour with horns curving forward and slightly inwards. They give more milk than South Devons, but are not so big, weighing from 450–500 okes.

3. *The Freisian Breed.*—Only one bull of which has been imported but from its distinctive colour which is normally predominant in the cross-bred progeny it is familiar in many dairies now. The colour is black or black and white in distinct patches. They weigh about 500 okes and are the heaviest milking breed there is.

4. *The Kerry Breed.*—Was first imported in 1931 from Ireland with the object of using them in the Paphos District. They are a small breed, weighing 350–400 okes, always black with horns curving upwards to a point. They are smaller milkers than the other breeds but they live well under poor conditions such as obtain in Paphos District.

3. METHODS OF IMPROVING CATTLE BY BREEDING.

(1) There are 2 main ways of improving the cattle in a country for any desired object, and these are as follows :—

1. *The method of selection within a breed.*—By the selection of the best animals in the breed as a foundation herd. From them only the best animals are retained for breeding and by continued selection within the breed the standard of production is slowly raised. This method is slow but it has the advantage that it is more certain to lead to definite improvement of the breed in question than other methods.

2. *The method of grading up.*—By selecting a foundation herd of the breed and crossing them with another breed, thus combining qualities of 2 breeds. The process of crossing is continued and this is called "grading up" a herd. It produces much quicker, but often less permanent results than the first method.

(2) This first method is one in which no cross breeding takes place, all selection being within the one breed. It has been done in such countries as England, Denmark, India, and with the Africander breed of South Africa. The second method relies on crossing the local breed with one which has certain outstanding qualities that the other lacks. An example of what this means will explain it clearly. If a native breed of cattle are poor milkers, but resistant to the diseases and conditions of the country, it is possible to improve them by grading them up with an imported milking (or beef) breed. The cross-bred cattle derived from these two breeds generally contain some of the good qualities from each parent, such as resistance to disease and better milking (or fattening) capacity. These cross bred cattle can be mated together, and it is even possible by close breeding to fix a new strain altogether. The first cross animals can also be mated again to either parent, thus producing animals that contain three-quarters of the blood of one breed or the other; this crossing back to either parent can, in fact, be carried still further if desirable. This method of breeding (grading up) is necessary in countries where there are large numbers of cattle of poor quality, as for example in North and South America, or in Tropical countries where the native

cattle are of little commercial value. In the former case the process of " grading up " can be carried on indefinitely because there is no reason to fear the likelihood of the highly-graded cattle succumbing to disease. In the latter case (*i.e.* in Tropical countries) examples of which are Trinidad and South Africa, it is undesirable to increase the amount of imported blood in the graded animals beyond a certain point, because then they are not able to withstand disease and they become inferior in every respect ; similarly an imported breed kept pure would not be a success because it could not withstand the conditions of the country.

(3) To summarize the foregoing we can say that improvement of cattle can be effected in 2 main ways : (*a*) by selection, always within the breed and always eliminating undesirable characters, (*b*) by grading up, and either continuing to grade up where no limiting factors exist, thus finally improving by selection, or alternatively ceasing to go beyond a point when there are limiting factors which make this undesirable.

4. CROSS-BREEDING.

The method of crossing 2 pure European breeds is generally a commercial proposition, and not one in which breed improvement is aimed at. First cross cattle have a characteristic vigour often resulting in earlier maturity and greater weight. Thus when fattening cattle are desired it is common to use a bull of one breed on cows of another, but usually the cows are bought for the purpose and no breeding policy is carried out. Thus cross-breeding is most often done when beef cattle for sale are desired, and seldom when milk production is aimed at.

5. CATTLE BREEDING IN CYPRUS.

(1) How far, then, is all this applicable to Cyprus? It is obvious that no general system of grading up has been pursued in the past, but rather that 2 types have been maintained, the native breed and the imported milking breeds. What crossing has been done has not gone on long enough to be considered as a policy of grading up the Cyprus cattle. This is because (*a*) the Cyprus cattle are used primarily for working, (*b*) there is no big demand for beef of first-class quality, and (*c*) because the Cyprus cattle have remained almost pure except for occasional crossing with imported pure-bred or cross-bred bulls. Furthermore imported cattle have been distributed on a small scale to supply the limited demand for cows' milk. The improvement in milk production has come about rather by improved methods of management than by a deliberate policy of grading up.

(2) The Cyprus breed of cattle in the Messaoria are excellent for draught purposes and would not, probably, be greatly improved in that respect by a policy of grading them with imported bulls. But if the beef qualities of Cyprus cattle are to be improved, then crossing the local Messaoria cattle with imported bulls would be the most profitable thing to undertake. Probably, too, such cross-bred beasts would do as well as pure Cyprus beasts for working purposes, but because the Cyprus bull is preferred and is known to give good working animals the policy of retaining them is continued. In other words if working oxen of the local breed were no longer required the best policy would be to aim at grading up the local cattle with imported bulls to obtain good beef animals,

especially for export, and besides obtaining animals to fatten, the cows could be used for milk production if there was a market for the milk. It is not, however, necessary to grade up the cattle in Cyprus deliberately to improve their milking capacity because the imported breeds do far better and thrive well under Cyprus conditions; only by selection will it be possible to improve them in the future. The conclusion is, therefore, that if grading up the local cattle were resorted to on a large scale it would primarily be to improve their beef qualities for export and not their milking capacity.

(3) In the Paphos District, however, the smaller breed of cattle could well be improved by a policy of crossing and grading up with the Kerry breed imported from Ireland. This policy is to be encouraged in the future but it will doubtless be slow until the methods of management and feeding are improved. However, when carried out it should lead to a steady improvement in the type of cattle in that district, for all purposes, but especially should the graded cattle in a few generations be useful milkers as well as work oxen.

6. IMPROVEMENT OF CATTLE BY THEIR PERFORMANCE.

(1) It is necessary to explain how improvement of cattle, by either of the methods outlined above, can be achieved. A person who desires to begin cattle farming anywhere must decide what he is going to aim at producing; it may be either milk, beef, or work animals, or in some cases a combination of beef and milk (dual purpose). Whichever method is adopted it is essential to select the original animals with the object for what they are required always in mind. Thus when selecting a herd of cows for milk production cows that are obviously fat and "beefy" looking with poorly developed udders are useless. But by far the most important thing in starting, and in building up a herd of cattle, especially for milk production, is their records. Successful results will never be obtained without keeping records. For, as was stated above, selection must be carried out in the herd and only the best animals retained. Even when grading is carried out, the first cross animals must be selected before going a step further and those which do not come up to the required standard discarded. Records alone will show these points, and so they are indispensable to a person who wishes to be successful.

(2) Records should show especially (*a*) the parentage and date of birth of every animal, (*b*) the milking capacity of cows and how long they milk for, (*c*) their behaviour under local conditions, that is to say whether they milk easily or not and whether they are docile or wild, and (*d*) how soon they are mated after calving. In order to keep these records the dates of calving, service, and going dry should all be carefully recorded. By these means it is possible to obtain a clear picture of the merits of all animals in the herd and to eliminate those animals which have bad records.

(3) The value of a dairy bull can best be determined by the records of his daughters. A bull is usually chosen from a good milking cow but if he were also tested by the performance of his daughters his value would then be proved. If his daughter gave high yields of milk as well as his mother he would indeed be valuable—his value would in fact be proved. A son of such a bull would be of far more value than a bull whose records

did not give any such information as the milk yields of either his mother or his daughters. A typical method of recording cows and bulls is given below :—

EXAMPLE FOR COWS.

Cow : No. 17 (Ear No.) Born 20th June, 1929.
Sire : No. 2 (Shorthorn)
Dam : No. 11 (Cyprus Cow)
Markings : Red with white patches on belly.

Date of Service.	*By bull No.*	*Date calved.*	*Sex.*	*No. of Calf.*
17.9.31 ..	.. 3	.. 26.6.32 ..	F.	.. 22
3.9.32 ..	.. 4	.. 12.6.33 ..	M.	.. 25

Yield of Milk.	*Days sucked calf.*	*Days in milk.*
2,150 okes*	3	248
1,980 ,, ...	3	224

EXAMPLE FOR BULLS.

Bull : No. 2 (Shorthorn). Born 14 5.1926.
Sire : No. 1 (Shorthorn)
Dam : No. 5 (Shorthorn)
Markings : Roan colour.
1st service 1.5.1928.
No. of services in 1928
,, ,, ,, 1929
,, ,, ,, 1930, etc.
Records of Ancestors :—
Dams average milk yield 2,250 okes (3 lactations).
Sires' dams average milk yield 1,690 okes (4 lactations).
Sires' daughters (6) average milk yield 2,140 okes (6 lactations).

7. FEEDING OF CATTLE.

(1) GENERAL PRINCIPLES OF FEEDING.

(*a*) In order to appreciate the question as to how correctly to feed cattle it is necessary to give a very brief description of the reasons underlying the methods of feeding different classes of cattle. In the first place, therefore, it is necessary to discuss the formation of feeding stuffs and their proper classification.

(*b*) A live animal can be compared with a steam engine which is in motion. In order to keep it in working order it must have suitable fuel and be repaired from time to time as necessary with suitable materials. An animal requires different fuel and repair substances to a steam engine, and it can utilize them itself, but the principle is the same, and it must be suppled with these substances in the shape of food in order to keep it in working condition and in good health.†

* 1 oke = 2.8 lbs.; 9 okes = 2½ gallons.

† From the Ministry of Agriculture's Bulletin No. 48, pp. 3-4,

The "fuel" necessary to keep an animal alive, to supply it with heat and energy to move about and function properly, is supplied in the form of substances called Carbohydrates which contain sugars, starch and cellulose (fibre) and also in the form of fats.

The repair substances are called proteins; they are nitrogenous bodies and are used in the animal's body for the purpose of building up the flesh and muscle which in the normal way becomes used up as a result of ordinary bodily functions.

Besides these 2 groups of substances animals require small quantities of minerals, such as calcium, phosphorous, etc., and sufficient quantities of these are contained in most of the ordinary feeding stuffs on the farm, but especially in green food. Probably there is no obvious shortage of the necessary minerals in the feeding stuffs available in Cyprus.

(*c*) Foodstuffs can be analysed for the amount of these substances that they contain but, actually, all that they contain is not used by an animal. As with the steam engine some fuel and repair substances are wasted; for example in the steam engine fuel is lost in the form of ashes, and so in the process of eating an animal can not digest all the substances in the food and also some energy is lost in the actual process of eating and digesting the food.* The degree of digestibility of a foodstuff is an index to its usefulness because the foodstuffs which are not easily digested are of less value, since more of them would be necessary to fulfil the purpose for which they are required. Thus all foodstuffs can be classified according to the different amount of "fuel" or carbohydrates and fats and "repair" or protein substances that they contain and as to whether they are easily digested or not. Such a classification will be given in the following pages.

(*d*) Before doing so however, it is necessary to explain one other way of considering the usefulness of the substances contained in foodstuffs. The carbohydrate substances besides being the fuel of the animal's body are also, if fed in sufficient quantity, the fat forming substances, that is to say, fattening foodstuffs contain a lot of carbohydrates.

Proteins, on the other hand, are not fattening and are of more value to growing or milking than to fattening cattle. It depends, therefore, on the proportions in which these substances are supplied to any animal as to whether it will grow fat or not.

(2) CLASSIFICATION OF FEEDING STUFFS.

The different feeding stuffs available in Cyprus may be divided into two main classes:—

(*a*) Coarse or bulky fodders (*i.e.* barley straw).—These are those which are often low in digestibility and in the amount of protein they contain.

(*b*) Concentrated foods (*i.e.* cereals).—These are rich in the nutriment they contain and are the most easily digested; some contain a higher proportion of protein than others. The following table shows in full the different feeding stuffs in Cyprus according to their value as described in the foregoing paragraphs. (See also table at end).

* From the Ministry of Agriculture's Bulletin No. 48, pp. 3-4.

(i) *Coarse or Bulky Fodders.*

(*a*) Low in protein and digestibility.
Barley, oat, or wheat straw.
Ordinary grass.
Green barley, oats or maize
Silage (oats and vetches, or maize).
Oat hay.

(*b*) Higher in protein and more digestible.
Green lucerne or vetches.
Hay from lucerne, vetches or oats and vetches.

(ii) *Concentrated Foods.*

(*a*) Low in protein but fattening.
All cereals, carobs, bran.

(*b*) High in protein.
All legumes, *i.e.* favetta (gram), vetches, broad beans, linseed, sesame.
Cakes, such as linseed, sesame or cotton cake.
Meat meal, dried blood (both very high).

(3) HOW TO MAKE UP RATIONS.

(*a*) It should be born in mind that unless cattle are fed sufficient food to maintain them in good condition it is impossible to expect to get any profit from them. This applies especially to milking cattle and to cattle which are to be fattened ; working animals will carry on with insufficient food getting thinner and thinner but will finally be a complete loss if they have to be sold. Thus the following notes about feeding should be very carefully read and understood.

(*b*) In all rationing of cattle it is usual to consider the ration in two parts according to the purposes for which it is to be used. The first purpose is for the maintenance of the animal in ordinary condition and health. It is the basic ration below which an animal will at once grow thin and lose condition. This is called the Maintenance Ration. The second purpose is for production either of meat, milk or working energy. If a cow which has a calf suckling her is not fed enough food for the production of milk for her calf, she will use the extra fat in her body to make milk and in consequence grow thin. Eventually if continually starved she will stop milking and perhaps die. This ration which is made to provide milk or fat is called the Production Ration.

(*c*) The Maintenance Ration is usually made up mostly of coarse fodders because they are cheaper and provide the right amount of bulk necessary in a ration, but it is often necessary to give some concentrates as well. The Production Ration is generally made up of concentrated foods because it is not possible to give an animal the full amount of nutriment in coarse fodders alone.

8. SUITABLE RATIONS FOR CATTLE.

The next step is, therefore, to find out suitable rations for different purposes, because animals require different amounts of nutriment for

different purposes. Types of rations for the 4 main purposes will, therefore, be considered as follows :—

(1) Young growing animals.
(2) Working animals.
(3) Milking cows.
(4) Fattening animals.

(1) RATIONS FOR YOUNG GROWING ANIMALS.

A suitable ration for young calves would be :—

50–100 drams favetta or vetches (*rovi*).
50–100 drams oats or barley.

Total ¼–½ oke.

This quantity is enough for young calves, from, say 6 weeks to 2 months. From 3 months of age up to 1 year the ration should again be gradually increased. At 1 year old calves will eat 1½ okes of dry food if it is available. The following is a suitable ration for calves at 6–8 months old.

150 drams favetta or vetches.
150 drams oats or barley.
100 drams bran.

Total 1 oke. total.

Note.—400 drams equals 1 oke, equals 2.8 lbs.

As calves grow bigger still they will eat more barley straw and grass or green barley but at first it is unwise to give only a coarse fodder such as straw ; vetch straw is better for calves than barley or oat straw. When calves are 1 year old they will eat from 1 to 1½ okes of dry food, apart from straw, per day. After this it is a question of the circumstances under which the calf is being reared. If the owner can afford to feed it liberably, and it will pay to give a calf sufficient grain, the amount can be increased to two okes when it is 1½ years old. If the owner is poor he will probably not give it much grain and rely on chaff ; but in this way the calf will not grow as fast as it should and it will get what is called " Potbellied ", a fat stomach with thin sides and narrow width at the hip bones. Only by good feeding when it is young will a calf develop into the best type of ox or cow. Even a calf that is bred from imported animals will not grow well if poorly fed.

(2) RATIONS FOR WORKING ANIMALS.

It is often the case that animals are used for working when they are still young and small. This is a great pity because unless fed especially well under these conditions they may develop badly and be thin and narrow-bodied. An animal, 1½ years old, will eat a basket full of straw, or straw and green barley mixed per day. This is approximately 5 okes in all. Bigger oxen or cows may eat 7 or 8 okes of straw in addition to some grain (concentrates). Green lucerne or green food of any kind if it can be got is always good for animals. Lucerne hay, that is lucerne cut and dried in the summer and stacked in a room or yard, is very good

indeed. 2–3 okes of green lucerne and 3–4 okes of barley straw or 5–7 okes of barley straw is a sufficient quantity of bulky food for an average-sized animal but it is not enough to supply the full maintenance requirements and for this reason some concentrates are necessary. A working animal requires from at least 2 up to 3 okes of concentrates to supplement the ration of straw, etc. The full ration might be as follows :—

5 okes barley straw ½ oke vetches or favetta ½ oke barley	For maintenance.

and

½ oke vetches ½ oke barley ½ oke carobs	For production (working).

or

¼ oke beans, favetta or vetches ¼ oke linseed ¼ oke bran or wheat ½ oke barley or oats ¼ oke carobs or barley	For production.

1½ okes. Total amount of concentrates 2½ okes.

This would be a reasonable ration for a bullock or cow doing average work. If, on the other hand, it did only occasional work the production part could be reduced ; if it did continual hard work it should be increased. Such a ration as this is not unalterable. Many farmers will know by experience what kind and amount of food they can give their animals and keep them fit and in good condition. They may do reasonably well on less food than this but it is not advisable to give them as little as possible as they must eventually get thin, and besides which good feeding will keep them in better condition and prolong their useful life. It is not necessary to feed the two parts of the full ration separately They are described separately in order that the principle may be understood. In actual practice farmers will feed their cattle according to their own methods. Mixing all the ration together and feeding it 3 to 4 times a day or feeding the concentrates separately from the straw ; either method is suitable if that has been the custom.

(3) RATIONS FOR MILKING COWS.

(*a*) *General Points.*—The feeding of milking cows is, generally speaking, more difficult to do correctly than feeding growing, working or fattening cattle. Unless milking cows are given a ration which is well balanced in the amount of nutriment it contains they will not give their maximum amount of milk ; in other words lack of sufficient food will undoubtedly be reflected in a lower milk yield. Cows should be fed according to the amount of milk they give ; that is to say, a cow giving 16 okes of milk requires more food than one giving only 6 okes (see table below). For every oke of milk a cow gives she requires 150 drams of food containing the right amount of protein and fuel substances. This is the Production Ration and is quite apart from the Maintenance Ration.

(*b*) *Maintenance Ration.*—This is supplied by a mixture of coarse fodders and grain. Coarse fodders alone with the exception of lucerne hay will not give sufficient nutriment to maintain an animal in normal condition, and, therefore, some grain must be added. The bulky part of the Maintenance Ration can be made up with straw and green food (*e.g.* barley, maize or lucerne), lucerne hay, vetch straw, or oat hay (green oats cut long and dried in the sun). Cows will eat from 4–7 okes per day according to their size, appetite and the amount of other food they get. The more green food given besides straw, the better, as this makes the straw more liked and is good for the animals. Besides these bulky foods they require some concentrates in addition, as has already been stated. 1–1½ okes per day of a mixture such as is given below for production rations (1) or (2) would be correct or 1 oke consisting, for example, of :—

150 drams broad beans, favetta or vetches,

150 drams barley or oats,

100 drams bran or carobs,

would make a suitable concentrate ration for maintenance, in addition to the coarse fodder given. It is essential to realize that straw alone or straw and a little green food is not enough for a cow which is dry or not working. Some concentrates are always necessary. The only possible exception is when a lot of lucerne is fed to cows. This is a most nutritious food and very valuable and farmers would do well to grow as much of it as possible. If 2–3 okes of lucerne hay or 3–4 okes of green lucerne is fed to a cow less grain could be given, 200–300 drams of barley, oats or bran or a mixture of these would suffice.

(*c*) *The Production Ration.*—The following table shows the amount of food required for cows giving different yields of milk .—

A cow yielding	1	oke milk	requires	150	drams of food.
,,	4	okes ,,	,,	1½	okes
,,	6	,, ,,	,,	2¼	,,
,,	8	,, ,,	,,	3	,,
,,	10	,, ,,	,,	4	,,
,,	12	,, ,,	,,	4½	,,
,,	14	,, ,,	,,	5¼	,,
,,	16	,, ,,	,,	6	,,
,,	18	,, ,,	,,	6¾	,,
,,	20	,, ,,	,,	7½–8	,,

These quantities are, of course, over and above that amount of food needed for the cows' maintenance which has been dealt with above.

The following rations are suitable for milk production :—

(1) Normal ration, made up from foods which are easily obtainable in Cyprus villages.

½ oke broad beans (crushed).
½ oke bran.
¼ oke oats or barley.
¼ oke carobs.

Total 1½ okes.

(2) A similar ration without carobs would be :—

½ oke broad beans or favetta.
½ oke barley or oats (or ¼ oke of each).
½ oke bran.

Total 1½ okes.

(3) A ration which is perhaps rather better than the above can be made by buying linseed, sesame or sesame cake.

¼ oke crushed linseed, broad beans or sesame seed.
¼ oke sesame cake or ½ oke cotton cake.
½ oke barley or oats.
¼ oke carobs or barley.
¼ oke bran.

Total 1½ okes–1¾ okes.

A table is given at the end of this leaflet from which it is possible to calculate the right quantities of foodstuffs for different classes of animals. The table is given in 2 columns, each column expressed as units of "fuel" value and protein value, and the approximate requirements in units for each class of animal are given.

(4) RATIONS FOR FATTENING CATTLE.

The same amount of coarse fodders (straw, etc.) given for milking cows is suitable for fattening cattle, and in addition, 1½ okes of concentrates are required for maintenance and the same amount for production (fattening) at the beginning of the fattening period; *i e.* a total of 3 okes of concentrates and 5–6 okes of straw or similar fodder per day. For smaller animals (of, say 200 okes weight) 2 or 2½ okes of concentrates per day would be sufficient.

The following rations are suitable for fattening cattle :—

(1) ½ oke broad beans, favetta or vetches.
1 oke bran.
½ oke oats or barley.
1 oke carobs.

3 okes per day.

(2) 1 oke broad beans.
¼ oke vetches.
½ oke wheat.
150 drams oats.
½ oke barley.
150 drams linseed.

Total 3 okes per day.

These rations should be increased by half when the animal is fit to be finished off for the butcher, that is to say in the last month of fattening 4½–5 okes of concentrates would be necessary

9. HOUSING OF CATTLE.

(1) Most cattle are kept in yards or houses in Cyprus because there are practically no fenced-in fields into which they can be turned loose. The lack of pasture land in Cyprus is a great handicap in cattle husbandry because it is very desirable indeed to keep cows out of doors as much as possible both for their health and for the exercise they get.

Milking cows and young animals especially benefit a great deal from being out of doors in the sun, although in the hot summer in Cyprus it is better to keep them indoors or under shelter in the middle of the day. In winter, therefore, it is best to keep them out as much as possible and in summer only in the morning and evening.

(2) The type of sheds or houses in which cattle are generally kept in Cyprus are not very satisfactory. They are usually very dark, badly ventilated, with little or no system of drainage and bad floors. Only in the town dairies, which are required by law to come up to a certain standard of construction, are the conditions satisfactory.

(3) Well ventilated and light houses are necessary for cattle; ventilation shafts just above floor level, and windows in the walls to give light, are desirable features of all cattle sheds. The doors should be in two sections so that the top half can be opened separately. Sound floors of either rammed earth and chalk or concrete are best, but well made ones of cobble stones if kept in repair are satisfactory. The floors should have a slight fall towards the rear of the stalls, with a channel to collect the dung and urine and an exit hole through the wall to carry the liquid away. The mangers should not be built up high, but as low as possible as it is natural for cows to eat off the ground. Cows should have access to a tin or bucket of water, and if this is not also practicable for other stock they should be given water several times in the day.

10. MANAGEMENT OF CATTLE.

(1) METHODS OF FEEDING.

The common practice in Cyprus is to feed cattle 4, 5 or more times a day. This is probably because they so seldom get any grazing. Feeding 3 or even 4 times a day would, however, be quite sufficient. It is often customary to feed the chaff and grain mixed together, the idea being to make the chaff more palatable to the animals. This a sound idea and if always done is best continued, but in feeding milk cows it is preferable to feed the coarse fodders separately. Milking cows should be given the production part of their days ration before they are milked and the straw after milking. An example of the times of feeding cows in a dairy is as follows :—

6 a.m. 1st feeding, ½ Production Ration.
i.e. for cows giving 10 okes of milk, 1¼ okes.
7 a.m. feed ¼ of straw and green food.
10 a.m. feed ½ Maintenance supply of concentrates.
i.e. ¾ oke ; and ¼ straw.
1 p.m. feed ½ Maintenance supply of concentrates.
i.e. ¾ oke.
4 p.m. feed ½ Production Ration,
i.e. for cow giving 10 okes of milk 1¼ okes.
After milking feed ½ straw ration.

Between 7 a.m. and 10 a.m. or even up to 2 p.m. cows could well be turned out into a yard or tied in a field of lucerne, and only brought in again in the afternoon for feeding, grooming and milking. This time-table is, of course, adaptable to all cattle if desired.

(2) MANAGEMENT OF CALVES AND YOUNG STOCK.

In a dairy herd where all cows are milked after calving the calves should be separated from their mothers when they are a few days old. This is far better than allowing them to remain close by the cow for several months, especially as they may then be able to suckle her without the cattleman being aware of it. If the cows are not to be milked the calves are not separated until the cow goes dry, but these notes refer especially to dairy cattle in which separation is essential. A calf may be separated either when 2–3 days old or very soon after it is born In the latter case it will learn to drink more easily from a bucket and can be reared either on a liberal amount of whole milk, or on a limited amount with or without separated milk, thus enabling the dairymen to sell as much milk as possible. For the first few days of its life, whether separated at birth or a few days later, the calf should get the milk from its mother as this has qualities especially designed for the new-born calf. If the cow has a lot of milk she should be milked out and part only of the milk given to the calf while it is still suckling her. A calf can be taught to drink from a bucket if, after separating it from its dam, it is starved for about 12 hours ; it will then be hungry, and by putting one's fingers in the milk the calf will suck them and learn to drink the milk. The following two methods of feeding calves are given*, showing the quantities to be fed per day up to 8 months. In the first case (A) a large amount of milk is assumed to be available and in the second case (B) only a limited amount :—

	(A)		(B)		
Age	*Whole milk*	*Grain per day*	*Whole milk*	*Separated milk*	*Grain per day*
	okes	*drams*	*okes*	*okes*	*drams*
1st Week	2–3	—	3	—	—
2nd "	3–4	—	4	—	—
3rd "	5	70	4	1	70
4th "	6	70	3	2	70
5th "	7	70	2	3	70
6th "	8	100	1	4	100
7th "	8	100	—	6	100
8th "	8	150	—	6	150
3rd Month	6	400	—	6	400
4th "	4	550	—	6	500
5th "	2	550	—	5	550
6th "	1	550	—	Nil	550
8th "	Nil	550	—	Nil	550

The quantities after the 3rd month should always be gradually increased or decreased. The quantities of whole milk given in the first

*Adapted from the Kenya Department of Agriculture's Bulletin No. 18 of 1931.

case (A) could be reduced throughout if found to be uneconomical. A maximum of 6 okes at the 6th week being sufficient in such cases. The grain mixtures have been dealt with previously (section 8 (1)): when the calf is 3 months old a little straw or preferably lucerne hay or dried fresh lucerne should be given; from 1 oke increase up to 2 okes at 6 months; good hay is always to be preferred to straw in feeding calves.

To summarize the more important points in bringing up a calf :—

(1) Separate it not later than 4 days after birth, unless the cow is too poor a milker to be milked or is in poor condition.

(2) Feed part of its own mother's milk for at least the first 3 weeks, after which milk from any cow will do.

(3) Always feed at same time of day and make changes gradually.

(4) Heat up skim milk to normal temperature of fresh milk (95°F.) before feeding.

(5) Keep calves in clean pens and tie them up after feeding.

(6) Separate from other calves if scouring or sick and reduce milk at once.

(3) MANAGEMENT OF A CALVING COW.

A cow normally carries her calf for a period of 283 days or approximately 40 weeks. Before a cow calves she should be put in a separate shed or loose box, if possible, but in any case removed from the milking shed. She should be given plenty of straw to lie on and water to drink. About 1 month before calving it is advisable to increase the amount of concentrates in order to stimulate the production of milk and provide for the rapidly growing calf; an extra 1–1½ okes of concentrates would be sufficient. Thus a cow due to calve would get 5–6 okes of straw including, if possible, some lucerne, and 1½ okes concentrates (normal amount for dry cow) plus 1 oke (additional amount). When she appears to be going to calve this ration should be stopped and after she has calved a warm bran mash in a bucket should be offered to the cow and another about 3–4 hours later. Water should be by her all the time. The ration should be laxative at first and bran is an ideal food to include. If the cow has calved normally the ration should be gradually increased until in 5 or 6 days time, she is receiving from 2–3 okes of concentrates. Thereafter it should be gradually increased as the yield increases until in 3 or 4 weeks after calving she is getting her full production ration.

(4) MANAGEMENT OF BULLS.

Although few dairymen in Cyprus keep their own stud bull, relying on those maintained by the Agricultural Department, it is worth noting a few points in the management of stud bulls. Having selected a bull calf whose pedigree and appearance indicate him to be the best in the herd, he should be given especial treatment and feeding to allow him to develop rapidly and well. Careful handling, when young, grooming and exercise are all essential. A stock bull should never be allowed to get over fat and lazy and regular exercise is the best preventative of this. A bull can be used when he is about 15–18 months old. Then he should only be used occasionally, *i.e.* not more than once every week at first but gradually increasing the number of services as he matures. A bull is normally responsible for a herd of about 50 cows, but if the number of

services is carefully controlled and distributed evenly throughout the year as many as 200 could be taken from a full grown bull. For normal purposes, however, two services per week is the average number to allow a bull over 3 years old. Bull calves definitely not intended as stock bulls, should be castrated when they are under 6 months old, but in Cyprus it is usual not to castrate until they are 2 years old after they have been used for a short while.

(5) IMPORTANCE OF CLEANLINESS.

It is necessary to stress the great importance of cleanliness in the feeding and management of stock, especially of calves. Disease and infection is rapidly spread in dirty surroundings and dirty utensils. For this reason it is necessary to clean out sheds daily and dispose of manure as quickly as possible by carting it away from the sheds. All buckets and similar utensils should be thoroughly washed out daily. Boiling water is the simplest and best cleansing agent but buckets should also be rinsed first with cold or tepid water and then washed and rinsed in boiling water. Mangers and water troughs should be cleaned out and stale straw or green food removed and not allowed to remain and fresh food put on top of them. These points are most important if success is to be achieved.

TABLE OF FOOD VALUES.

Foodstuff	*Nutriment in 1 oke (units)* *Fuel value.*	*Protein value.*
1. COARSE FODDERS :		
Barley or oat straw	.65	.25
Vetch straw	.55	.10
Green barley	.45	.04
Green maize	.25	.02
Silage (oats and vetch)	35	.05
Oat hay	1.00	.12
Green lucerne or vetches	.27	.06
Lucerne hay	.85	.20
2. CONCENTRATES :	*Nutriment in*	*100 drams.*
(*a*) *Low in protein* :		
Barley	.5	.05
Oats	.4	.06
Wheat	.5	.07
Carobs	.5	.03
Bran	.4	.06
(*b*) *High in protein* :		
Broad beans	.45	.15
Favetta or vetches	.5	.11
Linseed	.85	.14
Sesame	.95	.12
Linseed cake	.6	.20
Cotton cake	.3	.12
Sesame cake	.5	.30

TABLE OF REQUIREMENTS OF ANIMALS IN UNITS OF "FUEL" VALUE AND PROTEIN VALUE.

	Approx. weight	*Fuel value*	*Protein value*
	okes		
1. Full grown working animal ..	350–450 ..	7–9 ..	$\frac{3}{4}$–$1\frac{1}{4}$
2. Cow, dry, in calf	350 ..	6–7 ..	.75
3. Cow in milk maintenance ..	350 ..	$5\frac{1}{2}$–6 ..	.6
4. Cow in milk maintenance ..	450 ..	$6\frac{1}{2}$ ..	.65
5. Cow in milk per 4 okes of milk	— ..	$2\frac{1}{2}$ ..	.6
6. Cow of bullock, to fatten ..	400 ..	8–10 ..	1–$1\frac{1}{2}$
7. Young animal to fatten early	250–300 ..	6 ..	$\frac{3}{4}$–1

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

DECEMBER, 1934.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fell
Nicosia District:							
Nicosia	61.32	45.94	6.60	16	2.50	—	—
Athalassa	—	—	6.65	15	2.38		
Morphou	63 38	46 84	5.72	16	1.19		
Makheras						—	—
Famagusta District:							
Famagusta	65.58	50.58	10.83	17	2.25		—
Akhyritou	63.00	46.00	5.56	16	1.77		—
Rizokarpaso ...	—	—	11.38	13	2.75		
Lefkoniko			10.35	13	3.00		—
Larnaca District:							
Larnaca	64.33	43.35	18.06	14	4.80		—
Lefkara			10.46	20	2.22	—	—
Limassol District:							
Limassol	64 87	49 13	7.71	17	2.28		—
Saittas	—		12.36	13	3.75	—	—
Trikoukkia... ...			13.74	18	3.35	—	—
Alekhtora	—	—	16.76	15	3 45	—	—
Paphos District:							
Paphos	57.32	54.58	12.79	20	4.00		—
Polis...			9.61	17	1.44	—	—
Kyrenia District:							
Kyrenia	62.03	55.74	16.16	20	3.58	—	—

Note.—Compiled from returns furnished by Public Works Department,

JANUARY, 1935.

District and Station	Shade temperature: Mean Maxim.	Shade temperature: Mean Minim.	Rainfall: Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	59.26	42.32	1.96	17	0.35	3.91	
Athalassa	—	—	1.38	13	0.23	3.65	—
Morphou	60.71	43.58	3.00	15	0.38	3.16	—
Makheras		—	5.30	6	1.50	6.62	—
Famagusta District :							
Famagusta	63.32	46.26	4.31	12	2.06	4.53	—
Akhyritou	60.00	42.50	2.64	12	0.65	3.42	
Rizokarpaso ...		—	5.27	15	1.15	5.83	—
Lefkoniko	—		2.88	13	1.08	3.91	—
Larnaca District :							
Larnaca	62.10	44.64	14.27	13	6.76	6.43	—
Lefkara	—		5.47	14	1.12	5.16	—
Limassol District :							
Limassol	62.23	44.81	5.08	17	1.27	4.51	—
Saittas			8.75	14	1.30	6.66	—
Trikoukkia	—	—	11.48	15	2.21	6.88	—
Alekhtora	—	—	5.26	13	1.24	4.44	
Paphos District :							
Paphos	54.13	50.81	3.30	12	0.57	4.50	
Polis...			4.22	13	0.58	3.86	—
Kyrenia District :							
Kyrenia	63.12	49.23	3.92	17	1.10	5.41	—

FEBRUARY, 1935.

District and Station	Shade temperature: Mean Maxim.	Shade temperature: Mean Minim.	Rainfall: Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	60.40	43.71	1.45	12	0.47	3.02	—
Athalassa	—		1.33	7	1.05	2.53	—
Morphou	61.88	44.96	2.24	13	0.68	2.87	—
Makheras	—	—	4.00	3	2.30	5.26	—
Famagusta District :							
Famagusta ...	63.72	45.61	2.59	10	0.50	3.50	—
Akhyritou	61.20	44.00	1.44	10	0.34	2.62	—
Rizokarpaso ...	—	—	5.68	14	2.15	5.21	—
Lefkoniko		—	2.35	10	0.75	3.09	—
Larnaca District :							
Larnaca	63.43	44.72	5.42	12	1.44	3.85	—
Lefkara	—		3.85	15	0.82	4.33	4th
Limassol District :							
Limassol	62.57	46.07	4.21	15	0.76	3.38	—
Saittas	—		7.48	14	1.23	6.20	—
Trikoukkia	—	—	10.35	17	2.20	5.76	1, 2–5, 17, 18, 20, 21, 25
Alekhtora	—	—	6.65	14	1.40	4.08	
Paphos District :							
Paphos	54.85	51.11	6.08	15	1.15	4.32	—
Polis...	—	—	3.82	9	0.95	4.01	—
Kyrenia District :							
Kyrenia	63.80	50.25	5.66	17	1.65	5.68	—

Note.—Compiled from returns furnished by Public Works Department.

EDITORIAL AND ADVERTISEMENT NOTICES.

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

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The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

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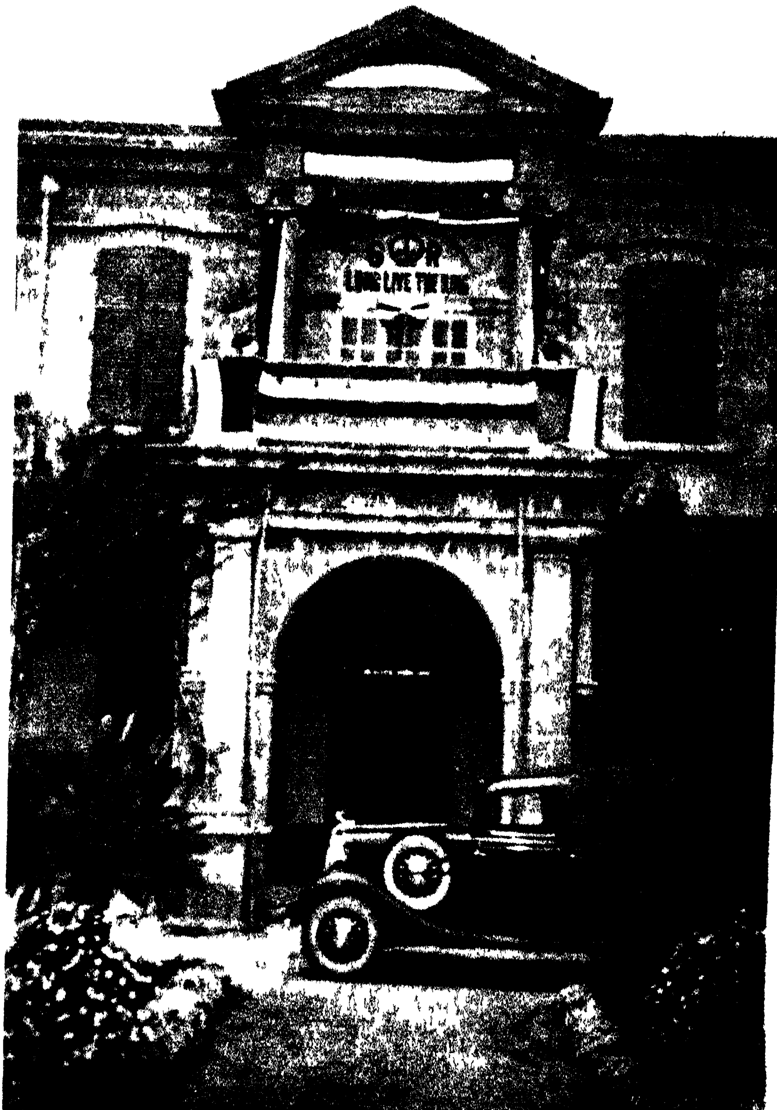


Headquarters of the Agricultural Department during the Jubilee Celebrations.

The

Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXX, Part 2 JUNE, 1935 Price 3cp.

EDITORIAL NOTES.

Agricultural Situation.

Cereals have been harvested under favourable conditions. The barley harvest started earlier than usual, but owing to rapidly drying climatic conditions a considerable area had to be left over until after wheat harvest to be reaped after exposure to the dew without which the crop would be too dry for harvesting. Wheat harvest is well advanced and excepting some areas in central Mesaoria localities, where the crop suffered badly from stem rust attack, the general production is very satisfactory. New barley has already been on the market since the middle of May and farmers who were short of wheat stocks started threshing wheat also. Except for some showers in April the weather has been dry with an unusual absence of night dews. Threshing of broad beans, vetches and cumin is already over and a good crop is secured in all cases.

New potatoes have been lifted and the production is very satisfactory and the prices are steady. Development of vines is normal, no outbreak of serious disease is reported and sulphuring is being carried out against Oidium.

Setting of olive fruits is very good and unless anything unforeseen occurs a good olive year may be predicted. A heavy drop is noticed in all the citrus groves and it is foreshadowed that the production will be poor.

Absence of late spring rains and night dews coupled with unusually prolonged heat waves has caused a certain amount of damage to tobacco plantations.

Natural herbage is plentiful and the after-math of cereal harvest is available for grazing. The condition of live-stock, generally speaking, is good.

* * * * * * *

Peristeronopiyi Animal Show.

A most successfull Animal Show organized by the Village Authorities of Peristeronopiyi was held at Peristeronopiyi on the 14th April, 1935. The show was open to all stock owners in Famagusta District and there were classes for horses, oxen, mules, donkeys, sheep, goats and poultry.

Exhibitors were attracted from most of the villages in the eastern Mesaoria and a number of villages in the Karpas. The class of stock exhibited was of an extremely good standard especially in the classes for horses, mules, donkeys and oxen. A sum of £23. 6s. was distributed in prize money. The show was held in conjunction with a village fair and a number of transactions in the sale of animals took place.

* * * * * * *

FORTHCOMING AGRICULTURAL SHOWS.

The following Agricultural Shows are expected to be held during the summer and autumn, 1935 :—

Place.	*Date.*
Omodhos	14th–15th September
Limassol	22nd September
Polis	24th September
Trikomo	13th October

* * * * * * *

DONATION BY MR. D. SEVERIS, KYRENIA, IN HONOUR OF HIS MAJESTY'S SILVER JUBILEE

Mr D Severis, Kyrenia, has donated a sum of £300 to be invested to provide prizes for the promotion of agriculture in Kyrenia District. This generous donation was made by Mr Severis in honour of His Majesty's Silver Jubilee.

* * * * * * *

ARISTIDES HARALAMBIDES.

It is with regret that the death of Mr Aristides Haralambides, Agricultural Chemist, is announced. The following note of appreciation which was recently published in the " Cyprus Mail " dated the 7th June, 1935, is reprinted for the information of readers of this Journal :—

" It was with very real regret that the whole community learnt of the sudden death recently of Mr. Aristides Haralambides, the Agricultural Chemist of the Government of Cyprus Although his passing was of tragic suddenness it was one which he himself would have chosen—in the full tide of his life and activities.

In many ways his career was remarkable and had always been associated with Government. Joining the service as a youth of 18 he gained his scientific experience as assistant in the Government Laboratory, at that time the only laboratory in the Colony After six years service in this capacity he was promoted Assistant Analyst. During these early years he played an important part both as analyst and prospector in the then early attempts at developing the mineral resources and the mining industry which in ancient times had made the Island of Cyprus justly famous For some time he was also analyst and assayer to the first company operating at Lymni Mine.

In October, 1913, Mr Haralambides was transferred to the Agricultural Department as Agricultural Expert and promoted to Agricultural Chemist in 1916 in which capacity his most important work was done. Following the close of hostilities Mr. Haralambides was sent by Government to study recent developments in agricultural science and analytical methods in the London laboratory of Dr. J. Augustus Voelcker, the official analyst to the Royal Agricultural Society of England. Here and elsewhere he

did excellent work and gained equally excellent experience which stood him in good stead throughout his subsequent career in the Agricultural Department of Cyprus. It is perhaps not generally known that Mr. Haralambides made so good an impression that had he not been a Government official on study leave, he would have received an appointment at the hands of Dr. Voelcker.

On his return to Cyprus in 1921 he was placed in full charge of the chemical laboratory of the Agricultural Department and throughout this period did yeoman service for the principal industry of the Island. His agricultural interests were wide and he possessed that happy blend of scientific knowledge and practical experience that made his services so valuable. In particular he identified himself with the development in the Colony of essential oils, sumach production, citric acid, pectin, soap manufacture and soil surveys. He was also a willing collaborator with the Government Laboratory in researches on the vitamins of citrus fruits and the purification of local salt.

Mr. Haralambides was probably one of the best known men in Cyprus and everywhere he was esteemed as an able chemist, a loyal Civil Servant, and a staunch and warm-hearted friend. None went away empty who came to him for advice or assistance and particularly to students and to youth he was indeed a fount of help and encouragement. His place will be difficult to fill but the sound work he accomplished for his country and his kindly generous spirit will preserve his memory.

S. G. W."

Olive Growing in Greece and Turkey.

THE following notes abstracted from the International Review of Agriculture, Rome, XXVIth year, No 3, March, 1935, are reproduced from a series of articles on olive growing in various countries published in the above mentioned Bulletin:—

"Greece is the third olive oil producing country in the world. Olive-growing is one of the most important forms of cultivation, in fact, about 14% of the total area under cultivation is devoted to olive growing and the products of the olive tree represent 17% of the total value of agricultural production.

The olive is generally found in all parts of Greece, continental and insular, but chiefly on the coast. The districts richest in olives are, in order of their importance, Crete, the Peloponnesus, the Aegean Islands, and the Ionian Islands and Eubœa, which produce about 90% of the total amount of oil.

It is at present estimated that the production of olives is worth 1,300 millions of drachmas per annum, while the total annual value of agricultural production is about 8 milliards.

The varieties cultivated are very numerous and are differentiated by the size and shape of the fruit (small, up to 2 grammes; average of 2 to 3½ grammes; large, of more than 3½ grammes), the colour, shape and size of the leaves, the period of ripening, resistance to certain diseases and pests, etc. A systematic classification has not yet been made of the varieties cultivated because, as in the majority of other olive producing countries, this problem presents certain difficulties.

At Mytilene, Volo, Kalamata, etc., the olive groves are fairly well kept. The custom is to perform 3 cultural operations a year on the groves; in October, in the spring and in the summer. In the plains the olive is generally grown with vines, cereals and various leguminous plants. The olive thrives on a great diversity of land. The rainfall is in Greece unevenly distributed, the greater part occurring in winter (November to March). The scarcity of water limits the possibilities of irrigating the groves.

During the War and the years directly after the War, the olive groves were decimated by excessive pruning to such a point that, in 1922, the Government took legislative measures to prohibit the ruthless cutting and pruning of olive trees. The effect of these measures came to an end in 1925 as the high prices for olive oil encouraged the planting of new groves, chiefly with olives the fruit of which was intended for the preserving industry. But, in 1929, when the olive oil crisis passed, the cutting of olive trees began again with the result that the Government, on 18th September, 1933, made a new law by which it is forbidden to cut olive trees without special permission from the official agricultural services.

The control of diseases and pests of the olive has been the object of constant attention on the part of the Government of Greece. It was estimated that during previous years the Dacus Oleæ reduced the annual production of olives by about 30%. This is why the "Olive Banks" and the "Insurance Banks for Olive Production" have been founded for controlling on the large scale the pests of the olive. Their expenditure is assured by a supplementary tax on the oil and on table olives.

In Greece there are no experimental olive groves, only some olive groves for demonstration purposes are found. These belong in general to private persons and are cultivated according to the advice and direction of the official agricultural services. Their aim is to demonstrate in a practical manner the economic advantages which accrue from well cultivated olive groves.

In Greece there is no legislation against cultivation of oil yielding seeds. On the contrary, the Government at present appears to be developing the cultivation of cotton, from which about 15,000 quintals of oil are extracted annually. Also, in Macedonia, about 5,000 quintals of sesame oil is produced annually for local consumption.

The number of oil factories existing in the country is insufficient for treating the whole harvest in a suitable space of time. For this reason the olives are kept for some time, either at the farm or in the mill, which has a prejudicial effect on the oils by increasing their acidity. These oils are absorbed by the Italian and French refineries while the good quality oil are consumed in the country or exported to England and the United States. The centres of production of fine oils are in the districts of Mytilene, Corfu, Kalamata, Laconia, Chios, Icaria.

No special stations exist for researches on olive growing, though the official agricultural services display a great activity in establishing olive groves for demonstration purposes in the various olive producing regions; they also carry on an intensive propaganda for improvement of olive growing by means of lectures, the distribution of pamphlets and publications, short courses in pruning, harvesting, oil extraction and the preservation of the product.

The value of olive oils exported does not greatly exceed that of the import of seed oils and fats (about 75,000 quintals annually), not counting the local production of seed oil which may be at present estimated at about 20,000 quintals per annum.

Greek exporters, if they wish to compete with the Italian and Spanish exporters, should give every care to the presentation and conditioning of the product and should carry out an adequate publicity campaign abroad for their oils which on account of their good quality should hold their own on the world markets.

At present the whole production of oil is absorbed without much difficulty by the internal market and exports, but the measures the Government is engaged in putting into operation for developing this branch of cultivation and the relative industry will cause, in the near future, a large surplus of olive oil in Greece for which new markets will have to be found.

Internal consumption cannot be greatly increased as the market is nearly saturated. This is why Greek olive growers should direct all their efforts, in the future, towards exportation (giving great care to the extraction and presentation of the oil, propaganda, etc) without, at the same time, forgetting the industrial uses of this product

Turkey—Olive growing is of great importance in Turkey, about a million persons are occupied in this cultivation and the relative industries. The total area on which olives grow is about 750,000 hectares, of which only 160,000 are cultivated. The total number of olive trees is estimated at 75,000,000 which are distributed unequally over the country. Of that number 15,000,000 are cultivated, the rest consist of wild olives

The production of olives intended for oil extraction rose, during the period 1929-1933, to 1,150,000 quintals per annum from which an average of 210,000 quintals of oil were extracted annually In years of abundant production as much as 350,000 quintals have been obtained. The climate of Western and Southern Turkey is very favourable to olive growing. The olive grows sporadically on the coast of the Black Sea, though it is found cultivated on the borders of the Sea of Marmora from Izmid (a town in Asia Minor situated on the coast east from Constantinople) to the Dardanelles and from the Dardanelles to the Syrian coast. These cultivations, in certain regions, extend as far as 30 to 50 kilometres into the interior of the country, according to local conditions. In these regions plantations of olives cultivated alone cover a large area.

In the provinces of Adalia, Mugla and Milas, there exist groves of wild olives which the Government tires to render profitable by budding.

The principal olive growing regions are as follows —(1) district of the Aegean Sea; (2) district of the Sea of Marmora; (3) district of the Mediterranean. The first of these districts possesses the best cultivated olive groves in Turkey and gives the greatest quantity of oil; the second district produces chiefly table olives and the third has the greatest number of olive trees which for the most part grow wild.

The olive grows on a great variety of land showing that it is not particular as to soil. All the same land situated on the slopes of hills is preferred for olives as the water is able to flow away easily.

The olive trees are planted 4 years after being budded in regular rows 10 metres apart and 8 to 10 metres between plants. In groves where the olive is grown in association with vines the distance betweeen rows is 12 metres.

A systematic classification of varieties has not been made. They are generally divided into two large groups: (1) olives for oil extraction (2) olives for the preserving industry. There is a great number of sub-divisions within these two groups, taking their names from the localities where they are grown.

In 1931, the Ministry of Agriculture established an experimental nursery in which the majority of varieties cultivated in the countries in the Mediterranean Basin were planted. This principal object of this nursery is to obtain seedlings, to teach and make public the best methods of cultivation, to distribute plants and to carry out budding with varieties of the country.

The Ministry of Agriculture has founded a Bureau for centralizing all questions relative to the control of diseases and pests of the olive.

The agricultural schools of Izmir, Bruza and Adana have courses for teaching the best methods of cultivation to olive growers.

Olive oil is obliged to compete with a great number of vegetable and animal fats. In 1934, a quota was established on the importation of oil seeds and seed oils.

The number of olive oil factories amounts to about 650 which are for the most part rather old and have only one mill. During the last few years a large number of modern plants have been installed furnished with two or three mills and hydraulic presses. The district of Ayvalik has 22 mills with modern installations and have a considerable capacity for production.

There are 6 factories for extracting residues oils Three of them are situated at Smyrna and the others at Kus-Adasi, Bayindir and Gumuslu. The annual quantity of residue oils obtained in these factories is about 3,000,000 kilogrammes, the greater part of which is absorbed by the 50 soap factories existing in the country.

The methods employed for extracting the oil range from the most primitive to the most modern. In almost all the oil factories three compressions are carried out.

The Ministry of Agriculture decided recently to establish an olive growing station for the study of the best methods of cultivation, and the extraction and preservation of the oil. This Ministry is also engaged in encouraging the foundation of co-operative societies of olive growers in the principal regions of production.

The prospects for olive-growing in Turkey are most favourable as the internal consumption of olive oils is insignificant (a little more than ½ kilo per capita per annum). Thanks to the measures taken by the Government for increasing this branch of cultivation the production of olives will be greater in future years and it is certain that, with prudent measures for the defence of olive growing, the internal market could absorb without difficulty three times the present production of olive oil."

"June Drop" of Citrus.

By B. J. WESTON, *Superintendent of Agriculture*.

AT this time of the year trouble is almost invariably experienced with the shedding of immature citrus fruit from the trees. This is known as "June Drop", although in Cyprus it commences before June and continues into the month after which it is named.

Although abnormal shedding of young fruits is said to be less severe with the Jaffa than with certain other varieties of orange (notably the Washington navel) the condition is frequently so severe in Cyprus as to cause considerable loss to growers. The drop also occurs to a greater or lesser degree on other types of citrus grown on the Island.

In years when blossoming is profuse the shedding of a large number of blossoms and fruits is necessary for the welfare of the tree, but should the shedding of small fruits continue so that the tree bears only a small crop, the condition is undesirable. Small crops usually mean large-sized fruits which are not favoured by the trade.

A number of factors come into play in determining the degree of "June Drop", but the investigations of Coit and Hodgson* have revealed that the most important one is that of water relationships at and immediately prior to the blossoming period. Hot dry weather and especially hot dry winds (such as have been experienced in Cyprus in May of this year) undoubtedly aggravate the condition by reducing humidity and probably extend the period during which young fruits are shed.

According to Fawcett and Lee† there exists a certain relationship between deficiency of moisture and lack of available nitrogen and if these two are combined the abnormal shedding of fruits is intensified and it is stated "that the presence of sufficient nitrates in the soil solution protects the tree to a degree against abnormal water relationships." "Trees that show nitrogen starvation may bloom heavily but set few, if any fruit." Now in Cyprus these conditions may frequently be found in citrus groves at the blossoming period, and although the cause of "June Drop" probably cannot be wholly attributed to them, the effects of the trouble are undoubtedly intensified by their presence.

During the warmest period of very hot days the amount of transpiration from the leaves will exceed the amount of moisture taken up by the root system. Water is, at this time, drawn from the young fruits to the leaves and although the deficiency of moisture is made up during the late afternoon and the following night, this fluctuation of the moisture content of the rapidly developing fruits from day to day leads to the formation of an abscission layer at the pedicel or the base of the ovary, causing dropping of the young fruit. The maximum drop usually occurs before the young fruits attain a diameter of ½ inch and the fruits gradually become yellow before dropping. Although citrus trees in Cyprus normally enter the blossoming period after a season of heavy rains when the moisture content of the soil is high, there frequently occurs at, or just prior to blossoming a spell of dry weather with wide fluctuations in day and night temperature; also, as this year, dry hot winds may occur at

* "An investigation of the abnormal shedding of young fruits of the Washington Navel Orange." Univ. Cal. pub. in Agr. Science, Vol. 3, No. 11 (1919).

† "Citrus Diseases and their Control." (McGraw Hill, 1926.)

this time together with low atmospheric humidity. Such conditions tend to upset the water relationships of the trees at this critical time.

There is in Cyprus a tendency on the part of growers to withhold irrigation water actually at blossoming time in order to counteract the effects of " June Drop " and indeed some evidence has been forthcoming that in certain circumstances such action is justifiable, although to what extent cannot at present be stated. No hard and fast rules for the control of the trouble, which appears to be mainly (if not entirely) phisiological in cause under our conditions can be given, but suggestions will be made in the following paragraphs which in the light of experience in other citrus growing countries, are well worth a trial here in combating " June Drop ".

The chief point to be kept in view is the necessity for keeping the trees in a vigorous and actively growing condition, at, and during the weeks immediately preceeding, blossoming This may be done by maintaining the soil with as high an organic content as possible, by the application of good bulky stable manure and the yearly addition of green manuring crops. Soils rich in organic matter are better capable of holding moisture for the trees during the critical flowering period In addition, and in view of the close co-relation of moisture and available nitrogen in the soil, an application of quickly available nitrogenous fertilizer should be given about 4 weeks before the trees commence blossoming. On the majority of Cyprus citrus soils the best form of quickly available nitrogen to use would appear to be sulphate of ammonia (not nitrate of soda) which should be applied at the following rates: trees 5 to 8 years old, ½ to 1¼ okes per tree; trees 8 to 12 years old, 1¼ to 2¼ okes per tree and older trees 2¼ to 4 okes per tree (depending on the age of the tree), the older trees of course receiving larger amounts than the younger trees It is possible that these amounts could be with advantage increased, but no information is at present available on the subject and growers would do well to try varying amounts for themselves to see which give the best results on their particular soils With young trees 6 to 7 years old the fertilizer should be worked into the soil in a ring round the tree about 3 feet in width and extending outwards from the outermost branches. As the trees become older the circle will increase in size. There is little point in placing fertilizer close to the trunk where there are few fibrous roots to absorb it, and as the root system extends to the centre of the rows between the trees with old trees, the fertilizer may when the trees are full grown be worked into the soil between the tree rows.

If good rains do not fall immediately after this spring application of fertilizer 4 weeks before blossoming, a thorough irrigation should be given to carry the soluble salts down to the root zone for the immediate use of the trees.

It is possible that the fertilizer treatment mentioned above could be given with advantage in two doses. If this is the case (and it is well worth a trial) the amounts suggested should be given in two equal doses; half 4 weeks before blossoming and half 3 to 4 weeks following blossoming.

The effect of hot dry winds, reducing humidity may, to some extent, be controlled by the establishment of suitable wind-breaks, and wind protection as an auxiliary measure for controlling excessive shedding of immature fruits is a point well worth bearing in mind when planting up new areas with citrus.

Production of Olives and Olive Oil.

BY OSMAN NOURI, Dip. Agric. (Wye),
Assistant Superintendent of Agriculture.

SOIL AND CLIMATE.—The olive tree thrives well in the dry semi-arid regions of the Mediterranean. It endures dry cold spells up to 7° C.–8° C. below zero but in humid colds at 10° C. below zero the branches die off. It may be grown successfully up to an altitude of 3,000 feet in Cyprus. As regards soil it is not exacting, it can be grown on deep rich soils as well as on stiff shallow soils. Chalky and chalky-clay soils are the very suitable types and heavy clay with excessive moisture and rapidly drying sandy soils are not suitable for olive growing. The deep, rich loams of the valleys and plains and under irrigation the olive tree grows luxuriantly but production is rather poor, whereas on hill sides and stony places, the growth is slow but production is more stable and the fruit and oil is of a higher quality.

PROPAGATION.—The olive tree can be propagated by seeds, cuttings and by grafting.

Olive tree cultivation at Kykko Metokhi, Nicosia.

SEEDS.—The wild olives are picked in October and November, soaked in water for 2–3 days when the flesh begins to rot. The flesh is then rubbed off in a bucket of water, the seeds settling to the bottom. Such seeds are washed in a lye solution and sown immediately after. If olive seeds are kept too long the kernel may deteriorate.

SEED BED.—Seed beds should be prepared a month or two before the actual sowing of the seed. The soil should be heavily manured with semi-decomposed stable manure and deeply cultivated. A week before actual sowing the seed bed is cultivated once more and the weeds removed. The seed bed is smoothed with a rake and at the time of sowing narrow furrows about 2–3 inches deep and 8–10 inches apart are opened. In these

furrows the seeds are placed 3–4 inches apart with the point preferably upwards and covered with soil. If there is no moisture the seeds after covering with soil are lightly irrigated preferably with a watering can. The seeds start germination towards the spring and in order to protect the young shoots from late frosts it is advisable to cover the seed beds with leaves or straw.

1st Summer treatment in the seed bed.—The seedlings should be healthy and vigorous. During summer months frequent hoeing and moderate irrigations will keep the beds clean and the plants healthy. In the following winter the seedlings might be protected against frost in the manner above referred to.

2nd Summer treatment in the seed bed.—In the following summer hoeing is required regularly but irrigations should be less. It is necessary to get the plants accustomed to dry circumstances otherwise plants grown in a humid soil when transplanted to dry places may suffer in the early stages. In the coming winter no further precautions are required against frost and the plants are ready for transplanting to the Nursery. The best months for transplanting are February and March.

THE OLIVE NURSERY.—A well drained level site with a moderately fertile soil should be selected as a nursery for young olive trees. The soil should be cultivated in autumn to a depth of 18″ to 24″ and ploughed in February to a depth of 10″. At the time of ploughing semi-decomposed farmyard manure should be applied to the soil. Before actual planting takes place the soil should be harrowed and levelled.

Olive seedlings when two years old are large enough for transplanting into the Nursery and small, backwards seelings should be destroyed. The seedlings used for transplanting are uprooted carefully, all bruised roots and rootlets are cut off with secateur, care being taken not to remove more than necessary, the stem is shortened to a height of about 15″ and planted in the nursery in lines 3 feet apart. The distance between the plants on the rows varies according to the length of time that the plants are to be kept in the nursery. If it is proposed to keep them in the nursery up to 4 years the spacing should be 3 feet apart; for shorter periods the space may be reduced to 18 inches or less. While planting care should be taken to spread the roots in holes carefully and fill in with fine soil at first and then with coarser soil finally pressing down the earth gently.

In the first year the young olive trees require frequent hoeing and moderate irrigation in order to overcome the drought of the summer months but in the second and subsequent years the roots of plants should have penetrated sufficiently deep so that irrigation may be dispensed with, except under abnormal conditions. All that is required is deep cultivation in February, March and two or three hoeings during the summer months.

CARE OF THE YOUNG TREE IN THE NURSERY.—In the second year of transplanting the young trees must be pruned by removing the lateral branches and the stems staked. In the third year the stocks are ready for grafting or budding and a suitable variety is worked on. The height of the grafting level should be between 12″ and 18″. The grafted nursery trees are treated similar to other fruit trees both in pruning and care. The head is usually formed after the second year of grafting or budding. The height of the head varies according to the site and soil of the olive

plantation. On rich sheltered soils this may be up to 4′. Where mixed farming will be the practice in an olive plantation, the head of the trees must of necessity be formed high. Young trees may be kept in the nursery as long as 6–8 years but as a general rule 3 years old grafts may be transplanted into the olive plantation.

OTHER METHODS OF PROPAGATION.—Olive tree may also be propagated from both hard and soft wood cuttings, a practice much favoured in America but almost unknown in Cyprus.

Another method of increasing olive production is by transplanting wild trees from forests which are budded within a year or two after planting. This is an unsatisfactory way of establishing an olive plantation as the practice generally is carelessly carried out and consequently a high percentage of failures. If this method is followed, care should be taken to select the best growing wild olive trees, uproot them with as complete a root system as possible, transplant in a temporary nursery and finally plant into the plantation the following year. Only the plants which are strong and healthy and which have withstood the summer should be transplanted.

GRAFTING AND BUDDING.—The practice of grafting or budding olive trees does not differ from general methods applied to other fruit trees. The type of graft mostly favoured is the wedge system. In practice the lower end of the scion is cut away from both sides so as to form a wedge having two eyes on it one near to the cut. The stock is cut back horizontally to the required height and the scion is inserted into an incision which is made longitudinally on the stock, tied and covered with grafting wax. Grafting is done in March. Budding is usually done in May and the procedure applied in the budding of other fruit trees should be adopted. With regard to grafting and budding the important general points to bear in mind are as follows —Select carefully the trees of the varieties to be propagated, mark healthy, vigorous and productive trees and give preference to fruit bearing branches for scions.

PLANTING OUT AN OLIVE PLANTATION.—As stated above the olive tree is a tree for the poor, rocky and hill side lands, in preference to the rich plains. The distance apart of the trees vary from 24′ to 40′ depending upon the fertility of the soil and the system of cultivation adopted. The field destined for an olive plantation is marked off at the required distances and holes 4′×4′×3′ are prepared early in autumn. The holes are left to weather during the winter and the actual planting is carried out in February or March. As the olive tree is planted mostly on poor soils, good preparation of the ground at the time of planting is essential to ensure success. At planting time the bottom of the hole is cultivated and after filling in a certain amount of soil mixed with manure the tree is placed on a small heap in the centre of the hole and the sides filled in gently with earth mixed up with manure. When the hole is filled up it is pressed down and a small basin is formed round the tree for reception of the water. The plans should be removed from the nursery with great care so that as few as possible of the roots are injured and before planting care should be taken to cut out with a sharp secateur any injured or dried roots. The aerial branches should be shortened to such an extent that the equilibrium between roots and branches is established. Owing to the fact that the trees are set back at the time of transplanting it is preferable to transplant the nursery stocks when they

a new head. If the trunk also is badly damaged then it is necessary to cut the tree a few inches below surface of the soil, provided that the stool is healthy. After these operations several shoots grow from the stool of which 3-4 strong ones are preserved for the formation of the new tree. These shoots usually are wild and they should be grafted. In the shaping of the tree each group of shoots should be considered as a single stem and the treatment should be made accordingly.

MANURING.—Although the olive tree is frugal in its food requirements yet its production will not be constant unless aided by manures incorporated in the soil. As in the case of all fruit trees olive tree removes the plant food from the soil without adding to it any ingredient and if the loss to soil is not replaced the olive tree will cease to bear fruit regularly and even it may become partially sterile. It should not be lost sight of that olive tree is more generally grown on poor land and under such circumstances manuring becomes doubly important.

The best manure for the olive tree is a slow acting manure of which the most suitable type is farm yard manure. It is applied at the rate of 100 okes per adult tree once every three years. Farmyard manure besides supplying the plant foods required by the tree improves the physical properties of the soil and helps the tree to stand more successfully the summer droughts. Farmyard manure is best applied with the winter cultivations. It should be spread in a layer under the shaded part of the tree leaving a bare circle round the trunk and it should be dug in the soil not deeper than 6"-8". Farmyard manure should be supplemented with superphosphate.

Green manuring improves an olive plantation and excellent improvement may result from cultivating a leguminous plant, such as broad beans, winter vetches or lupins at the commencement of the rainy season and ploughing them into the soil in February-March. Green manuring with the above crops supply nitrogen but phosphates must be added to the soil, potash is usually found in the soil in sufficient quantity.

Chemical fertilizers being readily soluble should be applied in spring in small doses repeated two or three times during the season. When purely artificial fertilizers are used the rate should be 1¼ okes per tree annually of a compound fertilizer or if a straight fertilizer is applied, use at the rate of 30 drams nitrogen, 15 drams phosphoric acid and 40 drams potash.

CROPPING AND HARVEST :—The olive tree comes into bearing quite late as compared with other fruit trees, usually it is 10 years old from seed before it produces the first fruit and it is 20 years before it is in full bearing. As mentioned elsewhere the flowers are on 2 year old branches any flower on one year old branches does not set. The flowering season is from March to May varying according to climate and lasts for about a month, but usually the flowers first appearing set fruit. A great number of olive flowers drop before setting fruit, otherwise the tree could not carry and nourish the fruit resulting from such a heavy flowering. The set fruit is a small green olive which gradually increases in size. In the first period it is the kernel that develops and until this attains its full size no flesh is put on. The kernel reaches its limit of growth towards the end of July or in August, after which the flesh begins to increase and continues to do so until the fruit is ripe. The olives when green are unripe but with approach of maturity they start changing colour, first reddish and later deep violet to black. The fruit is fully mature when it takes the

deep colour of the variety, and until this time it continues to grow and gain in weight. The formation of the oil in the pulp begins with the development of the flesh and continues to increase until full maturity. In addition to pulp in the kernel and in its woody part also a certain amount of oil is formed but these are of inferior quality.

Harvesting of olives should invariably be carried out by hand. Proper ladders or tripods should be used for the purpose. To wait until the fruits become overripe and fall to the ground and harvesting by beating with a stick are wasteful methods. Not only does the latter method destroy the quality of fruit but it causes such damage to the young fruiting branches which affects subsequent production and the broken branches shelter insect pests and diseases. For oil production the olives are gathered when their red colour changed into violet black. This occurs towards the end of October and November. The harvest continues until the end of December, and sometimes into January. There is a loss of produce both in early and late picking. For pickles olives are gathered earlier.

After picking the olives should be taken immediately to the mills for expressing the oil. If they are stored for a short time they should be spread on a dry floor in a layer not deeper than four inches so as to prevent fermentation.

PREPARATION OF PRODUCE FOR SALE :—The produce of the olive tree can be marketed in three forms (1) Green olives (raw or pickle), (2) Black olives (raw or pickle), (3) Olive oil Whatever the form in which the fruit is marketed the first and most important thing is to clean the olives from all foreign materials such as leaves, branches, etc., and get them ready for marketing or processing.

(1) *Green Olives.*—These are picked before the olives begin to change their colours. Best time in September–October. The green olives may be marketed as such to be pickled by the purchaser or they may be pickled either for sale or home consumption.

Pickling Green Olives.—A rough and primitive method is to crack the olives slightly under a stone, immerse them in clear water about ten days renewing the water every day. During this process the olives lose their bitter taste when they are salted or placed in brine. They may be consumed immediately This is the method in general use in Cyprus.

The modern method of green olive pickling is as follows —Grade the green olives removing all bruised or otherwise inferior olives, place in a barrel, pour on a 2% (2 oz. to gallon of water) lye solution made of caustic soda or potash, leave the olives in the solution for 15–20 hours, until the solution penetrates half way through the flesh of the olives and stir frequently with a wooden shovel. When ready to remove from the lye solution wash in fresh water for 4–5 days until all lye is removed. Next cover the olives with a 10 degree brine solution and leave for about 8 days. Place the olives in barrels, cover with a 30 degree (10 ounces to gallon) brine solution bung up and store in an open shed. The bung should not be driven too tight. The barrels should be examined from time to time and if the olives are not fully covered with brine it should be replenished with the standard solution. As soon as the fermentation is over the olives are ready for consumption. Any aromatic substance desired should be added to the final brine solution. The whole process takes about 4 months.

Black Olives.—It is much easier to conserve the ripe olives. Clean all leaves and impurities that may have become mixed with the olives. Place in a trough containing fine salt and mix once or twice a day. Under the influence of the salt the olives lose a juice which carries with it the acridity of the olives. In 4–5 days when sufficient bitterness of the olives has disappeared they are washed, superficially dried and put in barrels, jars, etc., and placed in a cool place. It is very essential that the pickled olives and particularly the green olives should not be touched with fingers. Always use a perforated scoop in order to remove olives from the receptacle.

Olive oil making.—The olives produce their maximum capacity of oil when they are fully mature, *i.e.* when their colour decidedly turns violet black. The oil is extracted by pressing. The method is briefly as follows :—The ripe olives carefully picked from the trees, preferably by hand, are cleaned from all foreign matters and taken immediately to the mill, where they are bruised with a stone, preferably with metallic bruisers. The pulp as well as the pips are reduced to a fine paste (although the oil from pips is of inferior quality in practice it is not possible to separate this from pulp). The finer the paste the more and easier is the expression of oil. The paste is filled in special rush-made baskets or sacks made for that purpose and placed one over the other on the press in the form of a column, putting 15–20 baskets or sacks to every column. The paste in the basket or sacks weighs 4–5 okes. The press is worked either with hydraulic power or by hand. When the column is made the press is brought into action pressing down the column of baskets. The pressure applied is about 200 lbs. to the square inch. Immediately the press is applied the oil begins to run out and flow towards the bottom of the column which is made of a circular trough. Through the spout of this trough the oil is emptied into a settling tank. When no more oil comes out the pressure is removed, the paste in each basket is stirred up by hand and after pouring 3–4 okes boiling water in each basket the column is made once more and the pressure applied. The hot water facilitates the running out of the oil. Although the oil obtained in this second pressure is of lower quality it is still good oil and there is no harm in mixing it with the oil obtained in the first press. More oil can be obtained by a second bruising and third pressing but its quality is low to mix with the good oil.

The oil as collected in the settling tank is turbid and it takes at least 48 hours before the oil is sufficiently clarified for skimming into storage vats. If the oil is removed from the collecting vats of the mills within a few hours it is necessary to look upon the first storage vats at home as settling tanks and treat the oil accordingly. The oil stands for about six months in the storage tanks when it undergoes a sort of fermentation settles and clarifies after which it is ready to be bottled or stored in proper jars or other receptacles. For further clarification of the oil it is filtered through several thicknesses of filter paper or through special filtering apparatus made for the purpose.

When bottling or storing olive oil it is better to choose a fine day. On a windy or stormy day with a low barometric pressure the sediments in the olive oil may rise up and cause turbidity, the temperature should be 12° C. to 15° C. (centigrade).

Clarification of the olive oil.—The natural way is by leaving the oil to stand undisturbed in a vat until it is clarified by settling. Under this

system as described above the operation takes a very long time. If a quicker process is required some other methods have to be applied such as filtration or by use of chemicals.

Filtration.—This is a method under which the oil is passed through porous substances which remove the impurities from the olive oil. The operation should be carried under normal temperature without heating. Manufactured olive oil filters are on the market and whenever possible they should be used.

Points to be noted in preparation of olive oil :—

(1) Don't pick olives when wet.

(2) Don't let the olives get mouldy or heated in a store before going to a mill. Try to express the oil as soon as possible after picking.

(3) Don't use wooden material in making olive crushing mills and presses. Wash and clean with boiling water all the apparatus before starting the season's work, absolute cleanliness is always necessary.

(4) Don't keep olive oil in wooden receptacles as the wood will impart a bad odour to the oil. Copper and zinc made receptacles are also not suitable and even are dangerous.

(5) Don't allow too much surface of oil to come into contact with air as this will produce oxidation and make the oil rancid. Close the bottles or other storing receptacles very tightly.

(6) Don't store olive oil in a damp and hot store. Olive oil store should be cool and dry.

(7) Don't allow various odours to come into contact with olive oil, as the oil will absorb such odours which are difficult to rectify.

Varieties of Olives grown in Cyprus.—Generally speaking the olive trees grown in Cyprus are of the oil bearing type. The minor deviation of the form in various localities gave rise to certain local names but this does not warrant the division of the fruit under different varieties. Unfortunately there is no standard scientific name known which can be given to the olive trees grown in Cyprus. The Department of Agriculture have imported recently the following varieties of olives from various countries and they are now experimentally grown on the lands belonging to the Department :—

Camelitana	St. Caterina
Morellona	Olivi Imprestati
St. Augustino	Asculana Dura
Ascolano	St. Agnese
Morinello	D' Sardeana
Cucco	

General Information.—The olive tree is extensively grown in all countries bordering the Mediterranean and its cultivation is of importance in Spain, France and French North African territories, Italy, Greece, Asia Minor and the various Mediterranean Islands. In America olive cultivation has been recently developed. The fruit of the olive tree, *i.e.* the olive, is a regular oval shaped fruit with a fleshy and oily pericarp and a pointed hard nut. In its early stages it is green but at the maturity it takes a reddish black colour. The olives are used for human consumption both as green or black pickles. Green pickles are of a lower feeding value and less digestible than black olives. The olive oil has numerous uses but in the principal growing countries it is mainly used for cooking where it supplies the energy producing ingredient and takes the

place of butter and fats. Good quality olive oil is used as salad oil and as such it is appreciated all over the world. Fine olive oil is used in preservation of best sardines.

The residue from olive oil production, still containing oil, is treated with carbon bi-sulphide and the oil thus obtained is used in soap making or other industrial purposes. It has very poor feeding value and its use for that purpose is not recommended. They are poor fertilizers and owing to a coat of oil they do not readily decompose, hence their use for that purpose is not recommended. The wood of olive tree is compact and homogenous, easily worked and is much appreciated in the furniture making industry.

Olive Pests.

By H. M. MORRIS, *Entomologist.*

THE OLIVE FLY (*Dacus oleæ*, Mg *Diptera, Trypetidæ*) causes considerable damage to olives, its eggs being laid in the fruit, where the larvæ live, feeding and tunnelling in the flesh and so spoiling the olive The fly is to be found from about May to the end of November, a series of generations appearing through the season. Fruit attacked by this insect is spoiled in appearance, and the oil obtained from it is less in quantity and poorer in quality. Fallen olives should be collected frequently and crushed for oil or destroyed. Olives should not be left on the tree longer than is necessary after ripening, and when gathered should be pressed as quickly as possible. A poison bait spray containing an attractive substance and a poison can also be used, a small quantity of the material being sprayed on to each tree about every four weeks during the summer. Owing to the activity of the fly it is very desirable for the measures against it to be applied throughout a village or other area. Windows and doors of olive stores and crushing mills should be covered with fine wire screens to prevent flies emerging there from escaping.

The OLIVE MOTH (*Prays oleellus* Fabr., *Lepidoptera, Tineidæ*), has three generations in the year, the larvæ of the first generation feeding on the leaves, of the second generation on the flowers and those of the third generation inside the stone of the fruit. The last generation emerges from the fruit about September at the stalk end and causes the fruit to fall.

The insect passes the winter as a young larva between two leaves joined together by a slight web ; it may be controlled by spraying with arsenical sprays for the first generation and by thorough cultivation of the ground beneath the trees to bury the pupæ in the autumn. Shaking the trees early in September may cause olives containing larvæ to fall, and these fruits should be at once collected and burned or buried deeply, or pressed.

The OLIVE TWIG BORER (*Phlœotribus oleæ*, F., *Coleoptera, Scolytidæ*). The adult beetle bores under the bark of the olive branches and there lays its eggs. The larvæ on hatching tunnel under the bark. The young adults leave the branches and bore for a time in the young olive twigs before attacking the branches. This insect is difficult to control, as are most insects which bore inside trees. Spraying the trees with stomach

poison at the time the beetles are about to start boring, about early July, gives some measure of control. Fumigation with HCN is effective, but is difficult owing to the size of the trees. Thorough and regular pruning is the best measure, and all prunings must be burned. Bunches of olive twigs hung in the trees in the middle of March make a good trap and these should be removed and burned in May.

The OLIVE WEEVIL (*Rhynchites ruber*, Fairm., *Coleoptera*, *Curculionidæ*), damages the leaves, shoots and fruit of olive trees. The adults appear in April and May and feed at first on the young leaves, but later the fruit is attacked. On the newly-formed fruit the adults damage the cotyledons, causing the fruit to dry and fall. On older fruit the adults feed by making a small hole in the epidermis and then eating the flesh around that, so causing a discoloured patch. The eggs are laid early in July, usually a single egg in each fruit, the eggs being placed under the epidermis in holes from which the adults have fed The larvæ on hatching from the eggs bore through the flesh into the stone. When full grown, shortly before the olives are ripe in late September or October, the larvæ bore out again through the side of the stone and flesh and pupate in the ground, the fruit sometimes falling from the tree. There is only a single generation in the year.

Thorough cultivation of the ground under the trees during the winter will destroy many of the pupæ Fallen fruit should be collected and destroyed or crushed. Trees should be sprayed with Lead Arsenate or Paris Green while the adults are feeding on the leaves in April and May. Adults may be collected by shaking or jarring the trees over sheets spread on the ground.

Disease of the Olive.

BY R. M. NATTRASS, *Government Mycologist.*

THE olive tree in Cyprus fortunately does not suffer severely from fungus diseases, no doubt owing to the fact that it is a native of the Mediterranean region. It may, indeed, be considered one of the hardiest of trees and the great age which it attains in Cyprus testifies to its general immunity to disease.

The following are the diseases which occur most commonly in Cyprus but with the exception of the last one on the twigs and branches they can rarely be considered as serious.

DISEASES OF THE LEAVES.

1. *The Leaf Spot or Blotch.*—This disease occurs usually only in a wet season and is caused by the fungus *Cycloconium oleaginum* Cast. In many respects it closely resembles the Black Scab or Spot of the apple and pear trees. It is easily recognized by the small greenish black velvety spots, usually not more than ¼ inch in diameter on the leaves. When severe the leaf stalk may be attacked and cause the leaves to fall. This, however, is only likely to occur in an exceptional season.

The disease can be controlled by spraying with Bordeaux Mixture in the early spring before flowering and again after the fruit has been picked. This, however, is rarely necessary and is not likely to be a profitable operation.

Indirect measures of control consist of pruning the tree to let in air and light ; not to plant olives in low lying undrained situations and to avoid the use of an excess of nitrogenus manures.

2. *The Sooty Mould or Fumagine.*—This disease is occasionally seen on the leaves, which become covered with a black papery deposit. This black deposit is the growth of several fungi to which the name of " Sooty moulds " is given, because of the resemblance to a deposit of soot. It cannot be considered an actual disease of the olive as the fungi concerned do not attack the plant itself but grow and live on the sugary excretions of insects, chiefly scale insects.

DISEASES OF THE FRUIT.

In Cyprus olive fruits are sometimes attacked by a disease known in other parts of the Mediterranean as the Dalmatian disease. It is caused by a fungus known as *Macrophoma dalmatica* which attacks the fruit when green. It is first noticed as a brown spot on the surface of the fruit. Below the skin the flesh is brown in contrast to the green colour of the healthy flesh. This diseased tissue may extend as far as the stone. As the disease progresses the diseased tissue begins to dry out causing the skin above to sink into a shallow saucer like depression.

If severe this disease may considerably reduce the yield of oil from the crop and, if much diseased tissue is present, it will greatly damage the flavour of the preserved fruit and extracted oil.

The same methods of control, both direct and indirect, as those recommended for " Leaf Spot " can be adopted.

DISEASE OF THE TRUNK AND TWIGS.

The Olive Knot or Gall.—This is probably the most important disease of the olive tree. It is easily recognized by the galls or tumours which form on all above ground parts of the tree ; they occur mostly on the twigs. The galls vary in form from small button like outgrowths to large tumours running several inches along a twig and often completely surrounding it. The tissue of the tumours is hard and woody so that they remain as part of an affected twig indefinitely. The disease occurs more frequently in the moister parts of the Island, particularly on both sides of the Kyrenia range.

The disease is caused by one of a group of minute organisms known as bacteria similar in shape and size to those responsible for many diseases in man and animals.

These bacteria live in enormous quantities in the tissue of the tumours and during wet weather ooze out onto the surface. Here they are washed down by rain or dew onto other parts of the tree. They obtain entry into healthy tissue through minute wounds such as might be caused by hail, fruit picking or pruning. Once having entered they start to multiply and cause further galls at each point of injury.

No direct methods of treating the disease are known. When planting up an olive grove care should be taken to see that all trees are free from galls. When grafting similar care should be taken with the scions. If the trees in a grove are already attacked, twigs and branches bearing galls should be cut out. The cut should be made well below the gall so

that the knife does not become contaminated with the bacteria and carry them to healthy wood. This, as well as the ordinary pruning operations, should be done in summer as during this period the galls are dry and no exudation of the organisms occurs. If done during the wet season infection is likely to take place through the cuts.

Further precautions to be taken are to remove any branches which rub against each other and to see that fruit picking is carried out with as little damage to the trees as possible. The common practise of beating the tree with poles cannot be too strongly condemned.

Note on Botrytis sp. as the cause of "Chocolate Spot" of Vicia faba in Cyprus.

BY R. M. NATTRASS, *Government Mycologist.*

DURING the early spring of 1935, a season of unusually abundant rain, broad beans were frequently attacked by the "Chocolate Spot" disease which has hitherto been attributed to *Bacillus lathyri*. Typical lesions on the leaves are from 0.5 to 4 mm in diameter, round or oval in shape but sometimes irregular. When more than 1 mm in diameter a brown centre is developed, surrounded by a chestnut coloured margin. Lesions, which also appear on the stems and petioles, are frequently confluent involving large areas of the leaf surface.

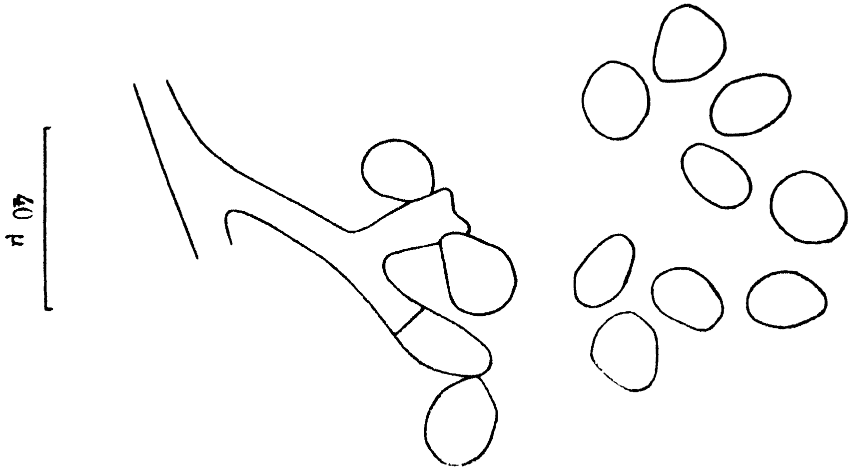
When kept in a moist atmosphere a copious growth of *Botrytis* always developed. Isolations from the lesions on the leaves, after surface sterilization, also yielded a pure culture of the *Botrytis*.

A culture of the fungus on malt extract agar slants produces a sparse growth of aerial mycelium and conidiophores, with the later formation of numerous sclerotia.

The conidia are borne on minute sterigmata at the slightly swollen apices of branched conidiophores. The conidial clusters are either terminal or intercalary. The conidia are sub-globose to oval, sometimes cuneform, measuring $13\text{–}20 \times 9\text{–}18\mu$. The sclerotia formed in culture measure $0.5\text{–}3 \times 0.3\text{–}2 \times 0.8$ mm.

Inoculations with a suspension of the conidia in water on to bean plants in the laboratory and in the field produced iron grey lesions after 48 hours. These, later, assumed the typical "Chocolate Spot" colour. Where a large number of lesions occurred close together the leaves were withered after 3–4 days. The fungus is a virulent parasite and is considered to be the cause of much of the "Chocolate Spot" disease in Cyprus.

The fungus appears to agree fairly closely with *Botrytis fabæ* Sardina, which is considered to be the cause of "Chocolate Spot" of *Vicia faba* in Spain (1). The size of the conidia of *B. fabæ* Sardina are given as $15.2\text{–}24.3 \times 10.9\text{—}18\mu$. and the sclerotia as $1\text{–}3.6 \times 0.9\text{–}2.2 \times 0.4\text{–}2$ mm In view of the similarity of the climate it seems likely that the Cyprus fungus is a form very similar or identical with that recorded by Sardina,



Conidia and portion of conidiophore of *Botrytis* sp. on *Vicia faba*.

REFERENCES.

(1) Sardina, J. R. Una Nueva Especie de *Botrytis* que ataca a las Habas. Mem. R. Soc. Espanola Hist. Nat. xv. 1. pp. 291–295, 1929. (Abstract in R. A. M. ix., p. 424, 1930.)

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.
MARCH, 1935.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell.
Nicosia District.							
Nicosia	66.32	45.07	1.60	6	1.10	0.88	
Athalassa		—	1.65	3	1.39	1.08	
Morphou	67.39	43.67	1.32	7	0.58	0.83	
Makheras	–		3.85	4	2.30	2.75	-
Famagusta District:							
Famagusta	68.29	46.39	0.46	4	0.18	1.11	—
Akhyritou	66.40	44.00	0.49	4	0.21	1.25	-
Rizokarpaso ...	-	—	1.90	4	1.15	1.87	
Lefkoniko	–	—	0.59	6	0.18	1.00	
Larnaca District:							
Larnaca	68.00	45.00	0.53	7	0.26	1.24	- -
Lefkara			—	—		1.63	- -
Limassol District:							
Limassol	66.97	46.87	1.60	8	0.89	1.58	
Saittas	- -	- -	3.85	8	1.31	3.28	—
Trikoukkia... ...	- -	- -	5.29	9	1.88	3.65	3, 4, 5
Alekhtora	—		1.14	5	0.60	1.56	- -
Paphos District:							
Paphos	57.52	52.32	1.10	4	0.50	1.73	—
Polis...	- -	-	1.85	5	0.60	1.66	—
Kyrenia District:							
Kyrenia	67.22	50.19	4.03	6	3.20	1.50	—

Note.—Compiled from returns furnished by Public Works Department.

APRIL, 1935.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	71.43	49.63	1.11	5	0.77	0.53	—
Athalassa	—		1.27	2	1.23	0.74	—
Morphou			0.72	3	0.52	0.47	
Makheras		—	1.30	1	1.30	0.74	—
Famagusta District :							
Famagusta	75.53	52.07	0.24	1	0.24	0.54	—
Akhyritou	74.20	49.50	0.27	2	0.22	0.52	—
Rizokarpaso ...	—	—	—			0.54	—
Lefkoniko	—		1.84	3	1.12	0.90	—
Larnaca District :							
Larnaca	74.63	50.00	0.56	2	0.55	0.71	—
Lefkara	—		0.72	3	0.40	0.58	—
Limassol District :							
Limassol	73.27	49.17	0.03	1	0.03	0.64	—
Saittas			1.48	3	1.05	1.61	—
Trikoukkia	—	—	1.09	3	0.44	1.70	
Alekhtora		—	0.29	2	0.17	0.90	
Paphos District :							
Paphos	60.37	55.43	1.00	3	0.60	0.69	—
Polis...			0.48	3	0.20	0.50	—
Kyrenia District							
Kyrenia	71.20	53.00	2.33	4	1.07	0.82	

MAY, 1935.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	91.65	61.42	Nil	Nil	Nil	0.28	—
Athalassa	—	—	,,	,,	,,	0.46	—
Morphou	88.36	57.23	,,	,,	,,	0.34	—
Makheras			,,	,,	,,	0.80	—
Famagusta District :							
Famagusta	88.47	60.26	,,	,,	,,	0.28	
Akhyritou	88.90	59.00	,,	,,	,,	0.22	—
Rizokarpaso ...		—	,,	,,	,,	0.79	—
Lefkoniko			,,	,,	,,	0.82	—
Larnaca District.							
Larnaca	90.00	59.00	,,	,,	,,	0.24	—
Lefkara			,,	,,	,,	0.64	—
Limassol District :							
Limassol	86.84	58.23	,,	,,	,,	0.34	—
Saittas	—		0.41	1	0.41	1.06	
Trikoukkia	—	—	0.46	1	0.46	1.28	
Alekhtora	—		—	Nil	Nil	0.41	—
Paphos District :							
Paphos	60.61	56.03	Nil	,,	,,	0.50	—
Polis...			,,	,,	,,	0.48	—
Kyrenia District :							
Kyrenia	90.16	63.23	,,	,,	,,	0.60	—

Note.—Compiled from returns furnished by Public Works Department.

EDITORIAL AND ADVERTISEMENT NOTICES.

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

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Annual subscription payable in advance 16*cp.* post free. Overseas subscription 18*cp.* (2/-).

SCALE OF ADVERTISEMENT CHARGES.

A special reduced rate is charged for all advertisements inserted. As the Journal is circulated throughout the Colony and copies are sent to all Colonies Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force :—

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„ Quarter page „	-	8	0

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The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

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Tobacco cultivation near Yialousa.

The

Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXX, Part 3 SEPTEMBER, 1935 Price 3cp.

EDITORIAL NOTES.

Agricultural Situation and Outlook.

Weather conditions during the summer have on the whole been seasonable although the heat has not been abnormal if the Island be taken as a whole.

There has been an improvement and increased stability of the prices of agricultural products and the tendency is for prices of many products to rise. Wheat and raisins, however, are two notable exceptions which show no indications of improvement

The condition of citrus trees is good but a moderate crop only is expected. The season has been good for apples, other deciduous fruits on the hills were damaged by late frosts and a poor crop resulted

There is an improvement in the production of carobs and the quality of the bean is much better than that of last year. A good demand is anticipated for the new crop.

The condition of live-stock is satisfactory in all districts and there is an abundant supply of straw. Mules, donkeys and oxen are sold at good prices for export.

* * * * * *

Importation of Seed Potatoes

With a view to raising the general standard of seed potatoes imported into Cyprus the Government has decided to impose a limit to the amount of scab that will be allowed. The following notice with reference to the Order in Council No. 1305 has been published in the *Cyprus Gazette* No. 2462 of the 30th August, 1935, and has also been circulated to importers in Cyprus and to others interested in the seed potato trade :—

"*No.* 1011.

With reference to the Order in Council No. 1305, *made by His Excellency the Officer Administering the Government in Council, published in the Cyprus Gazette of* 23*rd May,* 1929, *it is hereby notified that any consignment of potatoes which on inspection is found to be infected with Powdery Scab* (*Spongospora subterranea*) *or the Common Scab* (*Actinomyces scabies*) *to the extent of more than* 10 *per cent. of the total number of tubers with more than* 10 *per cent. of the surface scabbed, shall be considered to be not free from disease and shall be dealt with as provided in section* 6 *of the said Order.*

A. PITCAIRN,

Acting Director of Agriculture."

It should be borne in mind by the importers that a certain amount of scab on Irish seed potatoes is inevitable and if kept within reasonable limits is not detrimental to the crop.

* * * * * *

AGRICULTURAL PRODUCE (EXPORT) LAW, 1933.

Regulations cited as the Agricultural Produce (Potato) Export Regulations 1935, shall come into force on the 1st day of October, 1935.

* * * * * *

AGRICULTURAL SHOWS.

A successful Animal Show was held at Xylotymbou village on the 28th July, 1935. The Show was organized by the Agricultural Society "Dimitra" of Xylotymbou. Entries for exhibits were open to members of the Society only.

His Excellency the Acting Governor has kindly consented to open the Omodhos Show on the 14th September and the Polis Show on the 24th September.

* * * * * *

BEEKEEPING COURSE.

A five-day practical course of instruction in beekeeping was arranged at the Central Experimental Farm, Morphou, for a number of Junior Officers in charge of District areas.

* * * * * *

VISITS OF FARMERS TO PLACES OF AGRICULTURAL INTEREST.

A number of organized visits of groups of farmers to places of agricultural interest in different parts of the Island have been arranged by a number of villages this year. The Agricultural Officer in Charge of the area has in many cases been instrumental in organizing these tours and in planning a suitable itinerary. The places usually visited are the Central Experimental Farm, Morphou, Government Stock Farm, Athalassa, Saitta Experimental Vineyard, Trikoukkia Deciduous Fruit Nursery, the new orange plantations at Fassouri, Limassol, and Famagusta Citrus areas. When a station under the control of the Department of Agriculture is visited every facility is given by the Officers in charge to show the visitors something of the work in progress.

* * * * * *

PRIZES FOR SILK REARING IN GIRLS' SCHOOLS.

In order that a greater number of schools may be rewarded for their efforts in demonstrational silkworm rearing, it has been decided to give a prize of £1 to the best school in each district and a number of prizes of 10*s*. each to schools which record a certain standard of production.

Under this scheme it will, therefore, be possible for every schoolmistress who takes a reasonable amount of care with the demonstration and teaching to be sure of obtaining a prize of 10*s*.

* * * * * *

LIVESTOCK NOTES.

The next auction sale at Government Stock Farm, Athalassa, will probably be held next April and in future there will be only one sale every year, probably always in the spring. Small stock such as pigs, goats and poultry can usually be bought at any time, although at present there is no surplus stock of poultry.

At the last sale held on 12th April, very good prices were obtained, which is perhaps a sign of a general improvement in farming in Cyprus : in particular young pigs realized excellent prices, 24 head averaging £1. 14*s*. 4½*cp*. and 3 cows were sold at an average of £2. 8*s*. each. 97 sheep averaged £1. 6*s*. for adults and 13*s*. 7*cp*. for lambs. The few cattle and goats sold also fetched good average prices.

It is also worth noting that a crossbred cow in the herd has given 7 gallons of milk (26 okes or 28 quarts) in 24 hours—this is believed to be a record for Cyprus. This same cow has given just under 650 gallons in 116 days—an average of 5.6 gallons per day (20 okes or 22 quarts).

The District Stud Stables, Yialousa, were closed on the 30th June, 1935.

* * * * * *

CORRESPONDENCE.

The following letter received by the Editor from Mr. W Bevan, former Director of Agriculture, Cyprus, is published :—

" *To the Editor,*

'*Cyprus Agricultural Journal*'

Sir,

I have only just heard of the death of my old friend and fellow-worker, Mr. Aristides Haralambides, and should like, through the columns of your Journal (of which I was the first, and for many years, Editor), to pay my tribute to his sterling worth.

It was my privilege to obtain the sanction of the Cyprus Government to his transfer to the Agricultural Department, a change which he himself desired as affording him greater scope and prospects for his abilities than the post he then held in the Government Analyst's Laboratory in those days offered him

I never ceased to congratulate myself on the step then taken, nor, I think, did he ever regret it. At that time the Agricultural Department was just beginning its upward career and to assume new responsibilities, one of which was the control and supervision of chemical fertilizers for the first time being introduced into the Island

The Government, at my request, sent " Aristides " (as he was generally called) to Europe for the express purpose of learning the newest methods of analysing such manures, foodstuffs and other commodities, and also to specialize in the production of essential oils. From private reports sent to me, as well as from official sources, it was clear that Aristides had made full use of his opportunities, and his subsequent value to the Department amply proved this.

There was, at that time, no Law to control the chemical manure trade in Cyprus. All experience elsewhere had shown how easily this article could be adulterated ; that losses to the farming community would result from the use of adulterated fertilizers, and that disillusionment would inevitably deal a staggering blow to this new and desirable aid to agriculture. Mr. Haralambides, on his return from Europe, readily responded to my decision to carry out, until a law was passed, a systematic departmental examination of chemical manures at ports of entry, and at different stages of distribution in towns and villages. An outcry arose, as we had anticipated, at this somewhat high-handed action,

but Mr. Haralambides, who shared with me the odium, never flinched, but stuck loyally to his task. The results were such as showed the imperative need of legislation and of imposing penalties for adulteration. The analyses proved that, on the whole, fertilizers on arrival in the Island were fairly true to specification ; it was in the small retail shops and stores that adulteration was rampant. Importing merchants, at first opposed to interference, soon realized that the departmental seal affixed to the sacks was both a protection to themselves and a safeguard to farmers. The Law, when eventually passed, relieved Mr. Haralambides, as agricultural chemist, as well as myself, from an invidious, though self-imposed, position, and I believe it has worked beneficially ever since, though possibly amended in the light of later experience.

Mr. Haralambides was a painstaking, impartial and capable officer His analyses were reliable, and rarely, if ever, outside the recognized margin of error. He gained the confidence of merchants and farmers alike. Always experimenting and adding to his knowledge, and constantly engaged in all sorts of work of practical utility to the community, I feel sure that during the twelve years since I left Cyprus he must have contributed, in no small degree, towards the agricultural prosperity of the Colony. His was a staunch and loyal nature and he was a faithful servant to the Government and his country.

May I add how happy I am to find, on perusing an unexpected copy of your last issue, that so many of my old staff are still serving their country, in the Department, though some whom I esteemed have necessarily dropped out. It is a real pleasure to see so many familiar names and to read of their progressive share in that work the foundations of which we together strove to lay in the fast receding years.

I am,

Yours faithfully,

W. BEVAN,

30th August, 1935. *(Former Director of Agriculture).*"

Sericulture.

BY PH. CHRISTODOULOU, *Agricultural Officer.*

GENERAL HISTORY.

SILKWORM rearing was carried out in China *ab antiquo.* Empress Silingchi, the wife of Emperor Hoangti, is reputed to be the first woman to have undertaken silkworm rearing, in 2,600 B.C., and it is believed she devised a means of reeling the silk cocoons, colouring the silk and weaving it into clothes and luxurious veils For a considerable time, this industry was confined to the better class ladies of the Celestial Empire and it was carried out under the patronage of the Emperor and Empress of China. Because this industry was not known elsewhere and the silk was equally exchanged for gold, the Emperor of China enacted a law whereby capital punishment was inflicted on anybody who would dare to export silkworm eggs or silkworms to any other country, and they thus succeeded in keeping the exploitation of silkworms within their own boundaries for about 3,000 years.

In the year 419 A.D. a Chinese Princess was married to the king of the neighbouring country, Khotan (Turkestan), and she succeeded at the risk of her own life in bringing to her husband's country silkworm eggs and mulberry seed in her hair ribbon, where she taught the rearing of silkworms and the silk industry in general Communication, however, of the methods of silkworm rearing to foreigners was likewise prohibited in that country.

In the year 554 A D. two Greek Missionaries on their visits to various countries for the purpose of spreading Christianity, also visited Khotan, and having realized the importance of the industry they studied the methods of silkworm rearing and generally the manufacture of silk, and they succeeded, with danger of losing their lives, in exporting from that country silkworm eggs as well as mulberry seed in their cane sticks, which they took to the then Emperor of Byzantium, Justinian, who rewarded them very generously.

Silkworm rearing spread throughout the Byzantine Empire, of which Cyprus was a part at that time Later on the industry spread to Italy, Spain, France and all other countries where silkworms and mulberry trees could thrive.

THE MULBERRY TREE.

It is well known that the silkworms can live on mulberry leaves alone. The mulberry tree is a very hardy tree and can stand cold to 20° C below zero as well as very high temperatures and can, therefore, thrive throughout Cyprus, especially when grown on heavy and fertile soils.

Varieties of Mulberry Trees.—There are two distinct varieties of mulberry trees grown in Cyprus, viz.: (*a*) The black mulberry tree, *Morus nigra*, the leaves of which are very thick and indigestible and are very seldom, if ever at all, used for feeding silkworms Silkworms feeding on such leaves yield but a poor crop of cocoons and silk. (*b*) The white mulberry tree, *Morus alba*, the leaves of which are the most suitable for silkworm rearing. Types of this variety are grown throughout Cyprus, *e.g.*, grafted, ungrafted, early, late, silky, thin or thick leaved tree, etc.

Propagation of the Mulberry Tree.—The mulberry tree may be propagated either by seeds, suckers, layers or cuttings; the best method is by seeds.

Gathering and Preservation of the Seed.—The seed should be gathered from well matured berries obtained from vigorous trees, 10–25 years old. The berries after gathering are rubbed well in a pot with water, so that the seeds may be separated from the flesh. All seeds found floating should be rejected as they are infertile, only those at the bottom of the pot should be kept. These latter seeds are washed well until all foreign substance is removed and are then spread out in a cool place where they are stirred from time to time until they get dry. If they are not to be sown at once, they should be kept in bags in a dry place. The mulberry seeds retain their germinating power for 2 or 3 years.

Seed Sowing Season.—Sowing of the seeds is effected from March to July in beds in well prepared and manured soil. The seeds should be soaked in clear water for 24 hours and allowed to dry in a cool place prior to sowing, which should be at the rate of 1½ drams per bed 6′×3′. The seed, being very small, should preferably be mixed with fine earth or sand prior to sowing and should not be moulded very deep. It is advisable to sow it on the surface and cover it up with a very thin layer of sand and then press it well with a board The bed should be irrigated by means of a watering can and it should, after sowing, be covered with grass or branches of trees with a view to preserving the humidity and protecting the tender plants from heat When the plants grow up, remove the shelters and water the bed with running water.

Transplanting.—Transplanting is usually effected about a year after sowing of the seed, one foot apart, in a well prepared and manured soil; in this place the plants are weeded, hoed, supported, etc., until they are transplanted to their permanent site, that is to say after a year or two. The trees are planted in their permanent place 16′ to 20′ apart, depending on the nature of the soil : distance should be more in heavy soils and less in light soils.

In transplanting mulberry seedlings the so-called green transplanting may also be adopted This system consists of transplanting the seedlings when they have only 5–6 leaves. The distance between the plants in the rows should be not less than 18″. Under this system it is possible to produce well developed trees which are suitable for planting in the permanent plantation within one year.

Treatment.—During the first 3 or 4 years, the mulberry tree requires a number of irrigations, weedings and hoeings. After that when the roots penetrate deep into the ground, a cultivation once a year, opening of a basin in October or November, manuring and removal of the dead branches in February, should be quite sufficient. The trees should be irrigated in summer if sufficient water is available.

Grafting.—Grafting of the mulberry tree is usually carried out to provide the required kind of leaves for feeding the silkworms. Grafting is effected by budding in March–June or September–October, two years after the transplanting of the tree to its permanent site.

DISEASES OF THE MULBERRY.

Leaf Spot or *False Rust* (*Phleospora mori*).—This is one of the most serious of the diseases which occur in Cyprus. It is of sporadic occurrence and during years of drought appears so late in the season as to cause little damage. In a wet season, however, it makes its appearance about April.

The appearance of the spots on the leaves is very characteristic and consists of angular brownish spots up to ¼ inch in diameter, on which minute whitish incrustations can be seen with a magnifying glass. These incrustations are masses of spores which are washed by dew or rain on to healthy leaves on neighbouring trees and so spread the disease.

Unless the attack is very severe, when the spots run together and destroy large areas of the leaf, it does not appear seriously to affect the health of the tree, but renders large areas of the leaf useless for silkworm rearing.

Root or *Collar Rot* (*Armillaria mellea*)—This fungus is responsible for the death of large numbers of mulberry trees throughout Cyprus, particularly those which grow on the banks of irrigation ditches and in moist places generally.

The early symptoms are a yellowing of the leaves followed by a premature leaf fall; death of the tree usually takes place the following year. It can easily be ascertained if *Armillaria mellea* is the cause of death by removing the bark of the trunk at ground level White sheets of paper-like substance, which is the actual body of the fungus, will be seen between the bark and the wood

During the autumn, clumps of "mushrooms" frequently appear at the base of the dead tree. These are the fruiting bodies of the fungus; the presence of these also indicates that the tree has been killed by the "collar rot" These mushrooms should always be destroyed as soon as they are seen.

There is no treatment which is effective against the collar rot but as the fungus can live in the soil and attack other trees, it is important that dead trees should be at once removed All portions of the roots should be carefully collected and burnt The hole should, if possible, be left open for about a year Good results have been obtained by mixing lime and sulphur with the soil.

SILKWORM REARING.

Selection and Preservation of Silkworm Eggs.—Silkworm eggs are the eggs of the Silk moth and, owing to their size and colour, which resemble that of various plant seeds, they are commonly called silkworm seed.

One dram of silkworm seed comprises about 4,500–5,500 eggs. The size of the eggs laid by races which produce large-sized cocoons is larger and consequently a lesser number of these is contained in a dram.

Fertile silkworm eggs are slightly heavier than water whilst infertile ones are lighter, and for this reason when they are placed in a glass of water the fertile ones settle to the bottom of the glass whilst the infertile ones float on the surface.

Every silkworm egg contains a living creature, the embryo which breathes and consequently needs air; this is why silkworm egg producers place the seed in small quantities of 1-8 drams in shallow boxes which are perforated at both sides for the free circulation of the air.

The breathing of the silkworm eggs is more active during the first month after they have been laid and more particularly during the last month prior to hatching. For this reason silkworm eggs should always be kept in a well-ventilated, dry and cool place. Silkworm eggs kept in a badly ventilated, warm or damp place produce weak worms which are easily attacked by diseases.

Hibernation.—It has been proved by many experiments that the colder is the hibernation place the more vigorous are the worms. For this reason it is essential that silkworm eggs should be hibernated in the hills where they can be kept at a temperature of from 0° to 5° C.

Pedhoulas was selected by the Agricultural Department for the natural hibernation of the silkworm eggs as it possesses the required conditions. The compulsory hibernation period is from the 5th January to the 20th February.

In rooms where silkworm eggs are kept no lamps or fires should be lit, nor is it permitted to use them as sleeping rooms.

Silkworm Races.—Two silkworm races are reared in Cyprus: (*a*) the white race or Baghdad, which produces white cocoons, and (*b*) the yellow race, producing yellow cocoons, with many variations such as New Cyprus Race, Laugier, Taxy, Jean Blanc, Ascoli, Perougia, Bremond, Chinese, etc.

In various tropical countries, especially in Asia, apart from the above races there are many others in a wild state which have 2 or 3 generations every year and feed on various trees such as the oak tree, Ailantus and Castor oil plant, and they are named after their food plant. The value of the cocoons woven by these wild races is very small.

Hatching of Silkworm Eggs.—The hatching should coincide with the sprouting of the mulberry trees so as to ensure a supply of leaves for the silkworms immediately after hatching.

The sprouting of the mulberry trees varies according to the climatic conditions of each area; if the hatching takes place too early the worms will die as there will be no mulberry leaves, whilst if they hatch late the leaves will be tough and rather indigestible.

The method of hatching in practice in many villages of the Colony is primitive and it is a general custom for the women to wrap the silkworm eggs in cloth and cotton and place them on their person or in their bed mattresses for hatching. Such methods are most unsatisfactory as the eggs are deprived of the ventilation which is so essential, besides which the temperature is not steady, and under such conditions many worms die and those which survive are liable to be weak and easily affected by diseases.

The method of hatching small quantities of eggs by means of the wooden incubator now in use for the demonstrational silkworm rearings in Girls' Schools gives very good results. It is a very simple appliance and can be made out of a petroleum box at a very small expense. The incubator is provided with two or three shelves (telara) and on every shelf a piece of thin cloth is pinned or pasted, upon which the silkworm eggs are spread. The bottom shelf is of tin and on this a glass or plate of water is placed, and under the bottom shelf a receptacle containing olive oil and a tiny wick (idare) is fitted; the wick is lighted so as to create the required temperature; if a higher temperature is required, two or more wicks may be lit at the same time. The tin shelf when heated equalizes the temperature and the evaporation of the water facilitates the hatching of the eggs.

Properly-made incubators should be used for larger quantities (80–100 ozs.) of eggs.

Specimens of such incubators can be seen at the Headquarters of the Agricultural Department by those interested and their use will be explained by the Sericultural Service.

The temperature in the incubator should at the beginning be 16°C., rising by 1°C. every day up to 23°C., or it may be raised up to 25°C. without any danger of damaging the eggs.

The temperature should be observed by means of a thermometer placed within the incubator, but it should not be placed on the tin shelf.

During the course of incubation the eggs are turned over with a feather two or three times every day ; this permits the better ventilation of the eggs, which ensures their hatching simultaneously, which is a very important factor for good results.

The hatching usually lasts for four to five days and takes place during the early hours of the day. When the worms begin to hatch the eggs should be covered with tulle on which tender mulberry leaves are placed. The worms climb through the meshes of the tulle on to the leaves, which are then carried to the rearing house. Fresh leaves are placed on the tulle until all the silkworms are collected.

The reason why tulle is used is that it helps to cut the silk threads which accompany the worms on hatching, also it avoids removing unhatched eggs with the worms, which would result in an uneven rearing.

The worms after hatching should be placed on the layers. In order to prevent the worms falling through the meshes of the layers, sheets of paper should be placed on the layers temporarily.

The system of placing the worms during the first few days after hatching in sieves and covering them up is not recommended as it prevents proper ventilation of the worms

Silkworm Rearing House.—Any room may be used as a rearing house provided that it is not damp and is sufficiently ventilated.

A room of 5,250 cubic feet capacity is suitable for rearing the silkworms produced from 8 drams of seed

The more spacious the rearing room is the better ventilated are the worms and in consequence they become vigorous and healthy and are not easily affected by diseases.

Disinfection of the Silkworm Rearing House.—Before the worms are put into the rooms the latter must be well cleaned, and if a rearing has previously taken place in the same room its walls, ceiling and floor, as well as all the sericultural implements, stands, layers, baskets, etc., should be washed with a solution consisting of 3 okes of copper sulphate in 100 okes of water. The walls should then be limewashed with a limewash prepared at the rate of 20 okes of lime to 100 okes of water. As soon as this is done and before the walls are dry, the doors, windows, holes, cracks, etc., should be closed up and sulphur should be burned in the room at the rate of 2½ okes for every 5,250 cubic feet.

Layers.—The layers used by silkworm rearers in Cyprus are almost all made of canes. The canes from which the layers are made should be dry and they should be properly stripped of leaves so that dirt does not collect on them. Layers made of wire are recommended as the best for the purpose.

With a view to distributing the food easily and not preventing ventilation, the layers should be placed one above the other two feet apart on stands, the lowest being placed 2½–3 feet above the floor so as to avoid moisture and drought.

Equalization of the Silkworms.—In order to ensure equalization of the silkworms it is essential that all silkworms on the same layer should be equal, that is to say, they should all undergo the moulting stage at the same time ; failing that much inconvenience will be caused to the moulting worms, which are in great need of quietness, by the distribution of food to those which are not moulting. When the rearing is on a small scale, from only 1 to 8 drams of eggs, equalization of the worms is advantageous, but when rearing is carried out on a large scale it is preferable to have 2 or 3 rearings, which would be moulting successively ; the work would thus be conveniently spread over the whole rearing season.

In order to avoid uneven rearings the food should be provided simultaneously in the same proportion to all the worms on the same stand.

Spacing of the Worms.—Care should be taken that the silkworms are as thinly scattered as possible on the layers, so that they do not touch each other. The thinner the worms are placed on the layers from the beginning to the end of the season the better prospect there is of getting a good crop as the worms are more evenly fed and better ventilated and in consequence develop better.

Removal of the Refuse and Litter.—By "litter" is meant the residue of the silkworms' food and the excreta.

It is necessary that the litter should be removed at least once during each of the first four stages, and twice during the 5th stage because the quantity of litter and refuse is much greater then Much dampness is created in the rearing house during the last stage which contributes to the development of mould on the litter, which affects the health of the worms

The litter should be burnt immediately it is removed from the layers This is provided for by section 16 of the Sericultural Regulations, 1922.

Ventilation.—Ventilation is one of the principal requirements for a successful rearing and for this reason all the windows of the rearing house should be opened frequently and kept open for many hours daily except when a strong wind is blowing. It is advisable that the rearing houses should possess apart from doors and windows, apertures near the roof for the escape of the contaminated and warm air.

Temperature.—The temperature of the rearing house should as far as possible be kept steady, the most suitable temperature being about 22°C. The temperature should on no account fall below 20°C. because this will result in the prolongation of the life of the worms and cause greater difficulties in the rearing. On the other hand the temperature should not exceed 25°C., as in such a case the worms would be liable to flacherie and their silk supply would be of inferior quality.

Moisture.—Damp rooms are not suitable for use as rearing houses and should not be used as such, because dampness is the principal cause of infection of the silkworms by diseases.

The best means of avoiding dampness is by proper ventilation of the rearing house. artificial heating and regular removal of the litter. When the weather is damp a smaller ration of leaves should be given to the worms, which should not be very juicy. Occasionally a small quantity of lime should be sprinkled on to the layers.

Food of the Silkworms.—The only food for silkworms is mulberry leaves and the development and vigour of the silkworms are unquestionably dependent on the feeding they receive. When inadequate food is supplied their health is affected and they become an easy prey to diseases.

It is, therefore, essential that the silkworm rearers should, in the first instance and prior to their obtaining their supply of silkworm seed calculate the quantity of worms that their supply of leaves can maintain and on no account obtain more than that quantity. Silkworm rearers should concentrate their attention on the quality of mulberry leaves also since it is only in the case of worms fed on good quality leaves that the best results in cocoon and silk production are realized. Silkworms growing on defective leaves can not derive the requisite elements for their development.

The nutritional value of mulberry leaves depends chiefly on the ingredients of the soil on which the tree is grown and the treatment it receives. Extremely healthy leaves are distinguished by their deep-green colour, their sticky surface and their inelasticity and fragility.

A healthy mulberry tree retains its leaves until the beginning of winter. If the leaves lose their bright colour and turn yellow before this time, this should be regarded as a sign that the soil is poor in nutritional substances and steps should be taken to replenish them by adequate manuring, otherwise the leaves next year will be shrivelled and unsuitable for silkworm rearing.

Gathering, Preservation and Distribution of Leaves.—Silkworm rearers should pay particular attention to the condition of the leaves before they are given to silkworms; wet, dusty or torn leaves should be avoided. The gathering of leaves should take place during the early hours in the morning as soon as the dew has dried and again in the afternoon after the midday heat is over.

During transport, the leaves should not be pressed tightly in the baskets or sacks, as this will cause fermentation and worms feeding on such fermented leaves are likely to be affected by diseases. If the leaves are collected whilst in a wet state, they should be spread out in layers in a cool room other than the rearing room, until the moisture evaporates.

It has been observed that the more clean and devoid of moisture the leaves are, the more completely and readily they are eaten by the silkworms. In order to avoid excessive moisture the leaves gathered in the morning should be given to the worms in the afternoon and those gathered in the afternoon be given the following morning.

During the first two stages and part of the third silkworms should be fed on leaves from ungrafted mulberry trees which are tenderer and contain less moisture. These leaves should be cut very finely with a sharp knife and be given to the worms immediately after cutting. The leaves should be placed in the rearing room about half an hour prior to their being fed to the worms so that they may acquire the temperature of the rearing house, failing which they are liable to affect the stomachs of the worms.

During the fourth and fifth stages leaves with small twigs, preferably from grafted and ungrafted trees alternately, should be given to the worms.

When a steady temperature is maintained in the rearing room, about 22°C., food should be provided 5 or 6 times every 24 hours but always at fixed regular intervals; it is always preferable to give less food at more frequent intervals, when no wastage will result.

The quantity of food required by the worms cannot be accurately stated, it depends on the race and duration of the life of the worms, as well as on the temperature of the rearing house. On an average some 800 okes of mulberry leaves would be required to rear 8 drams of silkworm eggs.

Age and Moulting Stages of Silkworms.—The silkworms undergo 5 stages and four moults. The first stage is the period between the time of hatching and the first moult ; second the time between the first and the second moults ; third, the time between the second and third moults ; fourth, the time between the third and fourth moults, and fifth, that between the fourth moult and the rising.

Moulting is the time during which the worms remain motionless on the layers, without taking any food at all.

Rearers should be particularly careful just prior to and during the moulting stage of the silkworms in feeding the worms so as not to cut the silk thread attached to the leaves, which assists in the moulting process.

The duration of every moulting stage is not fixed but varies according to the temperature of the rearing house. It is shorter if the temperature is high and longer if a low temperature prevails. The duration of every stage likewise depends on the amount of food given to the worms. Given a steady temperature of 22°C. and a proper feeding, the rearing may come to an end within about 35 days, whilst at a temperature of 17°C. to 20°C., the rearing may extend over a period of 45 to 60 days.

Rising.—8 to 10 days after the last moult in the case of the yellow race and 10 to 12 in respect of the white race (Baghdad), depending on the temperature of the rearing house and the quantity of leaves supplied, the worms cease taking any food, discharge damp excreta (this is the only time that healthy worms discharge damp excreta), become thinner and more transparent turn quickly from side to side with their heads held up, and continuously emit silk threads.

When a sufficient number of worms evince these signs, the twigs should at once be placed in position becaue if this is not done the worms will spread their silk on the litter and layers.

The twigs, which should on no account be green, should be placed in parallel rows 1½ or 2 feet apart ; this will permit of a better ventilation and distribution of the leaves.

When most of the worms have woven their cocoon, those which have not done so should be removed to another layer with twigs. 3 or 4 days after the weaving of the cocoons steps should be taken to remove the litter carefully without disturbing the cocoons ; by so doing, the value of the cocoons will be enhanced.

The cocoons should remain on the twig for not less than 8 or 9 days, after which they may be collected, cleaned, selected and spread in thin layers for drying. If they are not to be reeled at once they should be stiffled, that is to say, the chrysalids be killed either by means of steam or warm air so that they may not pierce the cocoons. Pierced cocoons are not fit for silk reeling.

Production.—8 drams of silkworm eggs properly hibernated, hatched and reared may produce up to 60 okes of cocoons or even more.

The highest production of cocoons realized in the demonstrational rearings in the Girls' Schools during the year 1934 amounted to 78 okes per ounce (8 drams) of silkworm eggs.

DISEASES.

The principal diseases of the silkworms are :—Pebrine, Flacherie, Muscardine and Grasserie.

Pebrine.—This is a hereditary disease, that is to say, it is borne by the seed and when the seed is hatched the germs develop so quickly that they cause the death of the worms.

If properly examined seed bearing the official banderolle of the Agricultural Department is obtained, there is no need to fear this disease unless, of course, the rearing gets infected from a neighbouring one, but even so the infection will have no serious consequences as by the time it will develop, the worms will have woven their cocoons.

Flacherie.—This is the most destructive of the silkworm diseases in Cyprus. It mostly attacks the worms during the fifth stage and sometimes at the time of rising, that is to say, at a time when the rearer has incurred all the expenditure and is expecting to reap the fruit of his toil.

Flacherie develops when the rearing house is damp and not properly ventilated, when the seed has not hibernated in a cold place or not been properly preserved ; also when an abnormal temperature prevails in the rearing house especially during the moulting stages ; when the worms are thickly placed on the layers ; when fermented, dirty, wet, or dusty leaves are supplied to the worms ; when the seed is obtained from weak rearings which were affected by this disease even during the last days or hours of their life, or if the rearing is carried out in a room where the previous rearing was affected and which has not been disinfected.

Once the worms are attacked by this disease, there is no remedy at all. What the rearers should do is to spread lime on the layers and remove all the sound worms to another properly disinfected rearing house and place them thinly on the layers, raise the temperature to 26–28°C. and leave them without food for 6 to 8 hours The temperature should then be reduced to 22 C and the worms fed on leaves from ungrafted trees, which are more easily digested. Lime should be spread on the worms about one hour prior to every feeding, until they go to the twig.

Muscardine.—Muscardine usually attacks the worms after the third moult when they are reared in a damp environment. This is a fungus disease, the spores of which enter the body of the worms either by the intestinal tube or through the pores of the skin, which is quite possible as the spores only measure one thousand part of a millemeter.

The spores remain viable for 2 or 3 years and for this reason once a rearing has been attacked by this pest the room should be properly disinfected with sulphate of copper before it is used again.

This disease increases in an amazingly quick manner and causes death to the worms within about 10 days from infection.

If the attack takes place prior to the fifth stage the worms will certainly die ; if after the fifth stage, the worms may go to the twig but the cocoons woven by them will be of an inferior quality.

Spreading lime on the layers at frequent intervals, and separating the sound worms, are the only remedies recommended against this disease.

Grasserie.—This disease attacks the worms at all their stages, especially during the last. The cause of this disease is improper preservation of the seed after it is removed from the hibernation place ; high temperature during the first stages or bad ventilation ; also, feeding of the worms on lettuce leaves, etc., which is customary during the first stage.

Measurement of the Volumes of Standing Trees.

BY M. E DOMMEN, *Assistant Conservator of Forests.*

TREES are irregularly shaped bodies. Their shape never conforms to any recognized geometrical figure. A tree consists of an underground portion, the roots, and of an aerial portion, the stem or trunk, surmounted by a branchy crown.

For the purpose of this study, only the stem will be considered and the Aleppo pine is the tree under consideration. The stem of a tree is neither cylindrical nor conical, but is a solid intermediate between these two well known geometrical figures. Its exact volume cannot be calculated outright by any mathematical formula, and any calculation of its volume is more or less of an approximation.

In usual European practice, tree volume is calculated by multiplying the sectional area of the tree at 4 ft. 3 ins. from the ground by the estimated height of the tree, and further multiplying the product by a constant known as a form factor. The form factor is the ratio of a tree's true volume to the volume of a cylinder having the same sectional area at 4 ft. 3 ins. (breast height) and the same height as the tree in question. Form factors have been determined from a large number of accurate measurements of felled trees, and vary according to the species and to other factors such as age of tree, fertility of the site in which growing, density of the crop, etc. A common form factor is 0.5. An attempt was made to work out form factors in Cyprus, and to apply the results to the calculation of volumes of standing trees. Although the results achieved have been of certain practical utility, it has been found that tree shape in Cyprus is so irregular that the use of form factors which were averages for a wide range of tree sizes might introduce considerable errors in calculations and records of volumes of trees are being abandoned in favour of records of sectional area at breast height. The sectional area being calculated direct from the measured figure of a tree girth there is considerable accuracy in determining the sectional area of a tree or of a crop of trees.

Sectional area is an area figure and is a conception with which the timber merchant who buys trees is not familiar. Therefore, it is still necessary for the Forest Department to make volume calculations in order to advertise the particulars of trees which it from time to time puts up to public auction. By a series of careful measurements of large numbers of sample trees in Paphos forest, the figure by which the trees sectional area must be multiplied to obtain its true volume has been determined. This figure, or constant, varies according to the size of the tree and a table has been prepared showing, for trees of various girths, the conversion factor by which sectional area expressed in square feet must be multiplied to obtain the tree's true volume or cubic contents in cubic feet. The table follows :—

Tree's girth at breast height.	*Conversion factor, sectional area to volume ; multiply by*
2 ft.	14.2
3 ,,	17
4 ,,	19.1
5 ,,	22.1
6 ,,	24.5
7 ,,	26.4
8 ,,	28.3
9 ,,	30

A Review of the Citrus Season 1934-35.

SINCE 1932 it has been the custom of this Journal to publish in its pages a brief survey of each citrus export season and in the following paragraphs it is proposed to deal with the season which closed in June 1935.

Taken as a whole, the season was somewhat disappointing. "June Drop" took a heavy toll of the small fruit in the early stages of its development and production was a good deal lower than in the 1933–34 season. This was reflected in a reduction of exports of rather more than 30%.

The export of oranges commenced in November and the number of cases shipped was just less than 135,000. Much of the early fruit was of poor quality, particularly as regards colour shape, texture and thickness of skin. The December fruit showed a very high percentage of wastage and prices dropped to 6*s*. to 8*s* per case The wastage continued throughout the season to a greater or less degree and in addition to this Cyprus shipments had to contend with heavy competition with Spanish and Palestinian fruit Prices in general continued to be disappointing throughout the greater part of the season but with late fruit a ray of hope appeared and several shipments realized up to 24*s*. per case for sound high quality fruit.

The excessive wastage occurring in a number of shipments was due to a combination of factors among which may be mentioned. picking too soon after rain, improper wilting; rough handling in the groves. in transport from the groves to the packing houses, and in the packing houses: and unsuitable accommodation in the majority of the vessels carrying the fruit Mechanical injury of one sort or another was brought about and the climatic conditions prevailing at the time combined with certain of the factors set out above proved ideal for the development of the various rot-producing fungi.

The majority of the factors leading to wastage can be controlled if proper care is taken by growers and exporters in handling and if suitable fast well ventilated vessels are provided for the direct sailings.

Actually, in the season under review, less wastage occurred in consignments transhipped at Port Said (in spite of the extra handlings) than in the direct shipments. This was due to the fact that the so-called direct ships took an inordinate time to reach their destination and that storage accommodation in them was largely unsatisfactory. In normal conditions, however, and with suitable vessels on the direct run wastage would be minimized and the ideal to be aimed at is fast vessels with adequate ventilated hold accommodation. It is unlikely that this ideal will be completely realized until a considerably greater volume of fruit is offered for export to attract shipping lines having vessels of the required type.

Large fruit, the apparently inevitable accompaniment of a "short" crop were, as always, at a discount in the home markets whilst throughout the season coarseness of texture and thickness of skin together with a certain percentage of malformed fruit reduced the average quality of fruit offered from Cyprus.

There is no way of controlling size, but roughness of texture, thickness of skin and malformation, three factors which exert a strong influence on quality *can* be controlled to a large extent by careful bud selection in the nursery. Further, grading on the basis of quality particularly as regards the three undesirable characters mentioned above must be more rigidly practised by exporters if Cyprus citrus fruit is to attain and hold a good reputation in modern markets.

Shipments of Cyprus " round " oranges as in previous years fetched considerably lower prices than the Jaffa type fruit. This is to be expected as they are a definitely inferior variety and encounter strong competition from a superior variety of " round " orange from Spain. Under normal conditions it is unlikely that Cyprus round oranges will ever realize high prices and their further propagation is not recommended.

As in the 1933–34 season, approximately 50% of orange shipments went to the United Kingdom. Scandinavian countries increased in importance as consumers of Cyprus citrus fruits whilst exports to Germany decreased largely owing to financial restrictions in that country. Other countries of destination included Holland, France, Belgium, Jugoslavia, Kastellorizo, Sudan, Ceylon, Aden, Finland, Canada, Greece, Austria and Dodecanesia.

It is gratifying to record a further increase in the quantity of lemons exported in cases. A total of 6,319 cases were shipped of which 5,230 went to the United Kingdom ; France, Yugoslavia and Holland accounting for the bulk of the remainder.

As in previous years small quantities of bitter oranges and sweet limes were exported largely for seed purposes.

No grapefruit was exported during the year, but there was a larger quantity available locally and it is anticipated that export of grapefruit will commence in the course of two or three years

In the review of the citrus season of 1933-34 mention was made in the pages of this Journal of the need for better storage accommodation at the ports prior to and during inspection and whilst consignments are awaiting shipment after inspection. At Famagusta, the chief citrus port, this need has now been supplied and a very suitable shed has been provided which is the headquarters of the inspection service and has ample room for storing large quantities of fruit. The shed is situated on the wharf alongside which vessels loading citrus fruit can berth.

The increased storage accommodation will also greatly facilitate the work of the Inspectors and as exporters become accustomed to the routine of inspection and realize that the measure embodied in the Citrus Fruit Export Regulations are designed for their ultimate benefit and that of the industry as a whole, a general improvement in the allround quality of fruit exported should result. There are, indeed, signs already that the standards of grading and packing are improving, but there is still much ground to be covered before the industry can be said to be on a really sound basis. The importance of stamping the skin of each fruit must not be overlooked. This point has been constantly emphasized by importers and was also the subject of special mention in a report by the late Trade Commissioner for Cyprus in London. The majority of citrus fruit is eventually exposed for sale by the retailer unwrapped (and, therefore, without a brand mark) and unless the skin of the fruit is stamped with indelible ink it loses its identity.

Some improvements have been noticed in cultural practices during the season under review and the advent of Jewish settlers with previous citrus growing experience has undoubtedly had a beneficial effect on the industry. Particularly there has been noted a greater readiness on the part of growers to take active measures against the attacks of pests and diseases.

In the early part of the season there was a tendency to cut lemons in a very immature state. This is as undesirable as the practice of allowing them to reach the yellow stage on the tree as is sometimes done late in the season. The former results in a reduced juice content and the latter in a low acid content. Details as to the picking and curing of lemons has already been given in a Departmental Publication (Horticultural Bulletin 2) and it is not proposed to enlarge on the subject here.

As regards trial work with citrus, besides the planting distance, stock and strain trials now in progress at Famagusta, a trial has recently been planted with two imported varieties of lemon which are said to produce fruit all the year round when grown under favourable conditions. If successful in Cyprus the value of these varieties will be considerable. A trial is also being carried out with a late orange variety, known as the Lu Jim Gong which has the reputation in South Africa of being even later than the Valencia late variety. If established here this variety may materially extend the present shipping season and enable fruit to be available for export at the period when supplies in the home market are short.

Interest in the industry was again well maintained during the season. Practically the whole of the nursery stock available on the Island both from Government nurseries and private sources was planted representing an estimated increased area of about 2,000 donums, and the demand for trees was by no means satisfied.

Smut Diseases of Cereals.

By R M NATTRASS, *Mycologist*

SERIOUS loss is sustained each year by cereal growers from the smut diseases of wheat and barley. Much of this loss is easily preventable at little cost by treatment of the seed with a suitable disinfectant before sowing.

By continued treatment each season the effect becomes cumulative and should result in a steady diminution of these diseases throughout the Island.

The diseases which can be effectively treated are the Covered or Closed Smuts of Wheat and Barley, the Covered or Closed and the Loose Smut of Oats and the Leaf or Flag Smut of Wheat.

The Loose Smut of Wheat and Barley unfortunately can not be controlled by disinfectants but only by a treatment with hot water which is too delicate an operation for the farmer to carry out Crops attacked by these two diseases should not be used for seed purposes.

With the exception of the above loose smuts of wheat and barley all the diseases mentioned can be effectively treated by the wet formalin method a brief description of which is given below

In this method the grain is placed on a clean floor or tarpaulin and sprinkled with a solution of formalin of a strength of 12½ drams to 10 okes of water (= 1 pint to 40 gallons). For the sprinkling a bucket pump can be very effectively used. During this process the seed should be well turned and stirred to ensure that each grain is thoroughly wetted. The seed is then made into a heap and covered for four hours with sacks which have been soaked in the solution. It is then spread out to dry and sown as soon as possible.

This treatment is the most effective one available in Cyprus for the two Smut Diseases of Oats. The remaining diseases, *i e.*, Leaf Smut of Wheat and the Closed Smuts of Wheat and Barley, though effectively treated by the wet method, may also be controlled by the less troublesome dry powder treatment. In this treatment the disinfectant used is a dry powder, Copper Carbonate for wheat and Powdered Sulphur for barley.

The Copper Carbonate, which must be in a very fine state of division is a blueish grey powder and is mixed with the seed at the rate of 18 drams of powder to each kilé of wheat or 8½ drams to 10 okes.

The powder and seed must be thoroughly mixed together so that each grain is evenly coated with powder. This can be done by mixing the seed and powder together in a powder proof bag and shaking it vigorously

by holding the bag by the four corners. A better method is to mix the two in a special machine which can be loaned to villages from the Department.

Covered Smut of Barley is treated in the same way but Flowers of Sulphur replace the Copper Carbonate ; the quantity to use is as follows : 1 oke of sulphur to 11 kilés of barley of 37½ drams to 1 kilé of barley.

The dry powder treatment can be done at any time and should preferably be done immediately after threshing as it will keep the grain free from insects which damage it in storage.

Full details of the above diseases are given in the following articles published in this Journal :—

"Diseases of Cereals.—The Covered or Stinking Smut of Wheat ;" Vol. XXVIII, September, 1933.

"Diseases of Cereals II.—The Flag or Leaf Smut of Wheat ;" Vol. XXIX, March, 1934.

"Diseases of Cereals III.—The Covered Smut of Barley ;" Vol. XXIX, September, 1934.

Below is given a summary of the treatments to be given for the various diseases :

	Formalin Treatment	*Copper Carbonate*	*Sulphur*
	Wet.	Dry.	Dry.
Wheat :	Covered Smut	Covered Smut	Not suitable
	Leaf Smut	Leaf Smut	
Oats :	Covered Smut	Not suitable	Not suitable
	Loose Smut		
Barley :	Covered Smut	Not suitable	Covered Smut.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

JUNE, 1935.

District and Station	Shade temperature Mean		Rainfall				
	Maxim.	Minim.	Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	96.80	66.93	—	—	- -	0.15	—
Athalassa	—	—			-	0.05	-
Morphou	92.57	62.83		-		0.03	
Makheras	-		—	—		0.42	—
Famagusta District :							
Famagusta	95.33	61.73		—	—	0.18	—
Akhyritou	90.40	66.60	-	-	—	0.18	
Rizokarpaso ...	—	—	--		-	0.09	-
Lefkoniko	-	—	—	-	-	0.25	—
Larnaca District :							
Larnaca	94.00	67.00	- -		- -	—	-
Lefkara	—	-	—	—	-	0.13	-
Limassol District :							
Limassol	91.17	63.73	—	—	-	0.06	—
Saittas	—	—	0.82	1	0.82	0.61	—
Trikoukkia... ...	74.00	60.66	-	—	—	0.35	—
Alekhtora	—	—	-	-	—	0.06	—
Paphos District :							
Paphos	79.53	77.03	—	—	—	0.06	—
Polis...	—	—	- -	—	--	—	—
Kyrenia District :							
Kyrenia	90.28	66.59	—	—	—	0.05	—

***Note.*—Compiled from returns furnished by Public Works Department.**

JULY, 1935.

District and Station	Shade temperature		Rainfall				
	Mean		Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
	Maxim.	Minim.					
Nicosia District :							
Nicosia	97.90	68.35	—		—	0.07	—
Athalassa	—		—	—			—
Morphou	91.84	65.42			—	—	—
Makheras		—				0.18	—
Famagusta District :							
Famagusta	99 42	69 53	—			0.07	—
Akhyritou	93 00	68 00		—	—	0.02	
Rizokarpaso ...	—		—			0 04	—
Lefkoniko						0.32	—
Larnaca District :							
Larnaca	94 00	67 00	0.05	1	0.05	0.08	—
Lefkara						0.06	
Limassol District :							
Limassol	91 81	65 48	—				—
Saittas			0.05	1	0.05	0.28	—
Trikoukkia	79.84	60 03				0.11	—
Alekhtora						0.13	
Paphos District :							
Paphos	83 52	83 11	—		—		
Polis...				—		—	—
Kyrenia District :							
Kyrenia ...	88 24	68 14	—	—		0 01	—

AUGUST, 1935.

Nicosia District :							
Nicosia	98.10	68.23		—	—	0.09	—
Athalassa	—		0.10	1	0.10	0.03	—
Morphou	92 26	67.09			—	0.07	—
Makheras			—	—	—	—	—
Famagusta District :							
Famagusta	96.48	71 94	—	—	—	—	—
Akhyritou	94.00	69.60	—	—		—	
Rizokarpaso ...	—		—	—		0.04	—
Lefkoniko		—	0.48	1	0.48	0.09	—
Larnaca District :							
Larnaca	95.00	68.00	—		—		—
Lefkara	—	—		—	—	—	—
Limassol District :							
Limassol	92.16	66.71		—	—	—	—
Saittas	—	—		—		0.04	—
Trikoukkia	80.71	61.81		—	—	0.07	—
Alekhtora	—		—	—	—	—	—
Paphos District :							
Paphos		—	—	—	—	—	—
Polis...	—	—		—	—	0.01	—
Kyrenia District :							
Kyrenia	90.29	71.80	—	—	—	0.04	—

Note.—Compiled from returns furnished by Public Works Department.

EDITORIAL AND ADVERTISEMENT NOTICES.

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

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A special reduced rate is charged for all advertisements inserted. As the Journal is circulated throughout the Colony and copies are sent to all Colonies Overseas it may be regarded as a valuable medium for advertising.

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,, Quarter page ,,	-	8	0

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The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

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Ancient Olive Oil Press—Mesoyi village, Paphos District.

The

Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXX, Part 4 DECEMBER, 1935 Price 3cp.

EDITORIAL NOTES.

EARLY and abundant rains have fallen in all areas of the Island and the prospects for a prosperous year for crops and all farming activities are exceptionally good.

Agricultural operations are well advanced and farmers in all parts of the Island have been able to start sowing their cereals with every prospect of success.

Owing to the early rains and mild weather natural pasture is abundant.

* * * * * * *

VETERINARY NOTES.

The general condition and health of live-stock during this year have been very satisfactory.

The Anthrax vaccinations were carried out mainly between the 7th April and the 23rd June, during which period over 600,000 sheep and goats were treated Outbreaks of Anthrax during the summer months have been very few and only a small number of animals have died in each outbreak--the actual loss being negligible compared with the mortality of over 10 per cent. of the flocks which occurred annually before the vaccination scheme was put into operation.

There have been 15 fresh outbreaks of sheep-pox during the year and 14 areas remained infected since 1934. Despite the fact that the new outbreaks were in widely-separated groups in Larnaca, Limassol and Paphos Districts the spread of the disease has been checked effectively and only four village areas remain infected at the end of November.

Sheep-dipping continues to increase in popularity as flock-owners appreciate its value. There are now over forty dipping baths in the Colony.

* * * * * * *

DAIRY SHORTHORN BULL IMPORTED FOR GOVERNMENT STOCK FARM, ATHALASSA.

The first purchase made from the Grant of the Colonial Development Fund (£500 per annum for 4 years) was a Dairy Shorthorn Bull which arrived at Famagusta on 1st December.

This bull, IFORD AMBASSADOR 5th, a beautiful red bull, now 21 months old, is exceptionally well bred and should be of great value in improving the quality of the Dairy Cattle in the Island; his Dam gave over 900 gallons of milk (equal to 3,200 okes) in both her first two lactations and his Sire's Dam gave 1,080 gallons and 1,220 gallons (equal to 3,800 and 4,300 okes respectively) in her 3rd and 4th lactations,

It will now be possible to use this bull on all shorthorn and crossbred cattle near Nicosia, thus in time building up a type of Dairy cattle predominately Shorthorn. With a continuation of this policy of maintaining shorthorn bulls for service a more uniform type of cattle will be evolved and no attempt will be made to increase milk production by crossbreeding, a practice which in the end seldom leads to permanent improvement

* * * * * * *

RECENT AGRICULTURAL SHOWS.

Several Agricultural Shows were held during September, October and November.

On the 8th September the third Lysi Agricultural and Animal Show was held. This Show was up to the high standard of the previous shows held at Lysi with exceptionally good exhibits in the various classes for animals.

The Omodhos and the Polis Shows held on the 14th and 26th September respectively were opened by His Excellency the Acting Governor. Large numbers of visitors attended both Shows The Omodhos Agricultural Show is a revival of the Agricultural and Animal Shows which were held in the past at this village and the date of the Show was fixed to coincide with the old established annual Stavros Fair.

The Polis Show is the third successive Agricultural Show held in Polis and was organized by the Municipality in conjunction with a newly established Polis Village Fair

A most successful Agricultural, Animal and Industrial Show was organized at the village of Athienou on the 29th September, other Shows equally successful and well organized were held at Trikomo on the 12th October and Lefkoniko on the 10th November

* * * * * * *

A NOTE ON THE HIGH ACID CONTENT OF CYPRUS OLIVE OIL.

Although it is generally known that Cyprus olive oil is high in acid content, it may not be realized what a degree of acidity is actually attained. This high acid content is due to poor methods of manufacture of the oil and also probably to some extent to the inclusion of very immature fruit in the olives pressed.

Recently analyses of samples of olive oil from various parts of the Island were made in the Chemical Laboratory of the Department and the results obtained confirm that a high acid content is the rule rather than the exception, some oils reaching a degree of acidity which renders them unsuitable for culinary purposes.

Samples were taken fresh from the oil press and was found to vary in acid content from 3.75 to 4.50%, which is above the maximum margin recommended by Health Authorities.

There are several reasons accounting for the high acid content among which may be mentioned :—

(*a*) Indiscriminate collection and mixing of fruit ; fallen fruit being mixed with that picked from the tree.

(*b*) Impurities such as leaves, branches, soil, etc., brought in with the olives crushed and pressed out.

(*c*) Fermentation, due to storing the fruit in large heaps after collection and before pressing.

(*d*) Unhygienic Mill Houses. The fruit is brought in by donkeys which tread on the heaped up olives, incorporating soil and dung with the fruit. Olive oil residue is frequently left lying about in the houses after pressing and unclean receptacles also contribute to the general unsanitary conditions under which the oil is produced.

From some good quality samples of olive oil made from Cyprus olives when the oil has been produced under improved conditions, it appears that there is nothing inherent in the Cyprus olive which would render it likely to produce an acid sample of oil. To the contrary the Cyprus olive is thought to be very suitable for oil manufacture.

The remedy would appear to be largely in improving methods of manufacture, the introduction of filtering as a general practice, and in giving special attention to the avoidance of the undesirable conditions mentioned above.

* * * * * * *

FREE ISSUE OF MULBERRY TREES.

The Agricultural Department has arranged for the issue of mulberry trees this season from the nursery gardens and school gardens, free of charge, to farmers interested.

Farmers desirous of taking advantage of this offer should apply to the nearest Agricultural Station.

A total of 16,065 young mulberry trees was issued last season free of charge from nursery gardens and school gardens.

* * * * * * *

HIBERNATION OF SILKWORM EGGS.

Accommodation at Pedhoulas, in the same house as last year, has been rented by the Agricultural Department for the natural hibernation of all locally produced and imported silkworm eggs, where they will be under the supervision of the Agricultural Assistant stationed at Kalopanayiotis.

* * * * * * *

SERICULTURAL STATION, KALOPANAYIOTIS.

A total of 496 drams of silkworm eggs of different races and crossings was produced in the Sericultural Station, Kalopanayiotis, this year and will be available for sale next sericultural season, primarily to silkworm egg producers for reproduction and for the improvement of their own races.

A quantity of the eggs will be issued to girls' schools free of charge for demonstrational silkworm rearings.

* * * * * * *

COMPARATIVE STATEMENT SHOWING THE QUANTITY OF SILKWORM EGGS HATCHED OUT AND REARED DURING THE YEARS 1934 AND 1935.

District	1934	1935
	ozs.	*ozs.*
Nicosia	710	858
Larnaca	271	249
Limassol	179	138
Famagusta	1,130	985
Paphos	1,269	800
Kyrenia	1,026	940
Total	4,585	3,970

Prevention of Wastage of Citrus Fruit in Transit.

BY R. M. NATTRASS, *Mycologist.*

GROWERS and exporters of citrus fruit to Europe and the United Kingdom are aware that from time to time considerable wastage of the fruit occurs. Fruit, apparently sound, carefully wrapped and boxed, has been found on arrival to contain a large percentage of rotted fruits. Apart from the actual financial loss involved, consignments, a portion of which is useless, have an adverse effect on the market. Every effort should be made, therefore, to foster the demand for Cyprus fruit in Europe by ensuring that it arrives in sound condition. Importers are likely to refuse to handle consignments which they find from experience to contain much fruit which has to be discarded.

Though a certain amount of wastage is perhaps inevitable much can be done by the grower and packer to reduce this to a negligible quantity by a careful study of the factors involved and by taking simple precautions at each stage of the handling of the fruit from the tree to the ship.

Wastage of Cyprus oranges arriving in Europe is caused, almost exclusively by two fungi, the well known green and blue moulds. Other fungi occur from time to time but they are of little importance. Even the "Black Rot" *Diplodia natalensis*, which has caused heavy losses in shipments of Palestine oranges, does not appear to any extent in consignments from Cyprus, though it is known to occur on the trees in some of the older groves.

The most serious of the two moulds is the green mould. The first appearance of this mould on the fruit is a soft watery area. Under suitable conditions the area rapidly increases in size and becomes covered with a white bloom as the fungus breaks through the surface of the fruit This white bloom eventually turns into the familiar dusty green with the production of millions of spores The blue mould behaves similarly but is not quite so rapid a rot

Neither of these two fungi can penetrate the uninjured skin of healthy fruit, so that measures taken to prevent infection must aim at handling of the fruit without inflicting any injury to the skin. Such injury may take place at any time before, during and after picking

While the fruit is still on the tree wounds and abrasions may be caused by movement of the branches and twigs by the wind, causing chafing and thorn pricks. The importance of pruning and the erection of windbreaks in this connection is obvious. Puncture of the fruit by insects such as scale insects and fruit fly make the fruit readily susceptible to attack by rotting fungi.

The development of the green and blue moulds depends very considerably on temperature and humidity. Under dry cold conditions very little growth of the mould takes place. There is consequently little wastage in the consignments of early pickings. The amount of rot usually increases steadily as the season advances and reaches a maximum during March and April.

Moist winds with intermittent rain cause the skin of the fruit to become softer and thus more easily damaged. Picking the fruit during or immediately after rain, or while still wet with dew is to be avoided. Hot dry winds on the other hand have a hardening effect on the skin of the fruit making it more resistant to injury. The question of the effect on wastage of the type of soil has not yet been investigated in Cyprus.

As it is well known the skin of the orange is covered with a large number of minute oil vesicles or cells, which can easily be ruptured by pressing two fruits together or by rubbing with the thumb. Experimental work done in South Africa has shown that when spores of the green mould are placed on to ruptured oil vesicles, the fungus penetrates more readily than when the spores are placed on wounds in the tissue between the oil vesicles. It will be understood, therefore, that the slightest wound or abrasion invisible to the naked eye is all that is required to rupture the oil vesicles and thus break down the protective barrier and permit the entry of rotting fungi.

The spores of the green and blue moulds are probably everywhere present in the air so that infection of the fruit may take place at any time in the grove or in the packing shed. A source of infection in the grove is rotting fruit hanging on the trees or more often lying on the ground. These should therefore, when possible, be removed. Fungus spores, however, obtained in the grove actually during picking of the fruit consisted for the most part of fungi other than the green and blue moulds. These were chiefly spores of the black mould *Aspergillus niger* and spores of various species of *Alternaria* neither of which cause any appreciable loss in shipments of Cyprus oranges. In the packing sheds on the other hand large numbers of the spores of the two moulds occur and it is doubtless here that most of the infection takes place. Moreover, by the time the fruit is ready for wrapping, it will have sustained the maximum amount of damage.

Prevention of wastage, therefore, resolves itself mainly into careful handling of the fruit in all stages from picking to packing so as to avoid any of the minute injuries which lead to such heavy losses in fruit shipped abroad. Special care must be taken during the picking of the fruit as, at this stage, especially during wet weather the skin is very susceptible to injury. It is important that all workers who handle oranges should have the finger nails closely pared, especially the thumb nail which is responsible for a great deal of the damage done to the fruit. Growers are strongly advised to equip their pickers with cotton gloves in order to minimize this damage, a small outlay when compared with the increased returns which would result. When working with ladders care must be taken not to damage clusters of fruit by vigorously shaking the branches or by allowing the ladder to come into contact with the fruit. The fruit is cut by means of specially made round ended clippers. Pickers should be carefully watched until the foreman is satisfied that each one is exercising the proper care and skill. The Jaffa orange grows in clusters and pickers not infrequently force the clippers between the fruits of a cluster when cutting. The result is that the oil vesicles are ruptured by the pressure of the ends of the clippers. Fruit examined just after picking frequently shows smears of oil at the stem end where the oil vesicles have been broken by this means. It is significant that much of the rot developing in storage and transit begins at the stem end of the fruit.

When severing the fruit from the tree two cuts should be made, the first one at some distance from the fruit. The stalk should then be carefully shortened so that it does not project beyond the fruit and has no sharp point which may cause injury to other fruits in the picking basket. Pickers on ladders are equipped with bags or baskets slung round the neck. Fruit from these must be carefully transferred to the ground boxes or baskets ; they should never be poured in from a height.

All boxes and baskets should be lined with cloth or sacking and should be examined at the beginning of each day's picking to see that no splinters or pieces of stone project from the sides.

The process known as "wilting" whereby the fruit is kept for at least four days in order that a certain amount of moisture may be evaporated is of much importance in the prevention of wastage. During the process the skin of the fruit becomes hardened and is thus less liable to injury during the subsequent handling. Fruit, unless properly wilted, will not be accepted by the Produce Inspection Service for export. It is a common practice in Cyprus to heap the fruit onto the floor of a store near the grove to a depth of two or more feet. The result is that the lower layers remain warm and damp, providing ideal conditions for the development of mould fungi and, except in the first two or three layers, practically no wilting takes place. Oranges which have been kept for four or five days for wilting have been seen to have surface still moist when loaded on to lorries for transport to the packing sheds. For efficient wilting the fruit should be arranged, not more than two layers deep, on shelves in a well-ventilated shed and left for at least four days.

Though better able to withstand handling after wilting, the same care must be exercised in transporting the fruit to the packing house. Lorry drivers and loaders should be instructed to subject the fruit to as little shaking as possible. In the packing shed it is desirable that gloves should be worn by the packers or at least their finger nails should be kept as short as possible. Fruit should not be tossed from the grading measures into the size baskets as even at this stage bruising may result. In boxing the fruit the bulge should not exceed that required by the Produce Inspection Service, in order to minimize bruising of the fruit when the boxes are nailed down or placed on their sides.

A the time of loading, especially late in the season, the fruit is at a comparatively high temperature, favourable to the development of mould fungi. If this temperature is maintained during the journey to Europe it is likely that considerable wastage will ensue. It is important, therefore, that measures should be taken as far as possible to reduce this temperature so as to retard the growth of any fungi which may be present. Refrigerated holds are not yet available in ships sailing direct from Cyprus but ventilated holds should be insisted on. The boxes should be stacked on their sides or ends, not on the bulge and space must be left to allow free circulation of air round them. It may be possible in future to instal a pre-cooling plant at the port so that, by the time the fruit is loaded onto the ship it is already at a suitably low temperature at which moulds will develop slowly or not at all. With such an installation there would be little likelihood of fruit wasting to any great extent in transit as, at Famagusta, it could be transferred from the cool store on shore direct to the refrigerated holds.

Of future developments, disinfection of the fruits immediately after picking shows considerable promise. The effect of a suitable disinfectant is to destroy or to prevent the development of any mould spores which may be on the surface of the fruit. Preliminary trials were made with borax in hot and cold solutions and with Shirlan, a proprietory fungicide. In each trial approximately 300 fruits were used. The fruit was picked from the same grove in the early morning while still wet with dew and no special care was taken in handling, so that the fruit had every opportunity to become infected.

The following treatments were given :—

(*a*) Borax 7% strength at 43° C. for 5 minutes.
(*b*) Borax 7% strength at 43° C. for ½ minute.
(*c*) Borax saturated solution cold for ½ minute.
(*d*) Shirlan 1% cold dip.
(*e*) Control, no treatment.

After treatment the fruit was laid out in two layers for a period of six days. It was noted that the borax treated fruit was softer than the control and that the hot borax treated was softer than the cold borax treated. The Shirlan treatment appeared to have no effect on the consistency of the fruit The fruit was wrapped, boxed, and the cases transported by rail to Nicosia, where it was placed in a store for a period of 24 days.

On examining the fruit it was found that the borax treated fruit which showed excessive wilting at the time of wrapping had become much firmer and more attractive in appearance but did not compare favourably with the Shirlan treated or the control The amount of wastage during the period was estimated by counting the rotted fruits.

The following results were obtained .—

(*a*) Borax hot 7% 5 minutes	8.5%
(*b*) Borax hot 7% ½ minute	17.0%
(*c*) Borax saturated cold ½ minute	2.0%
(*d*) Shirlan 1% dip.	2.0%
(*e*) Control, no treatment	20.0%

It will be seen that the hot borax for ½ minute gave no control of wastage and the hot borax for 5 minutes only a moderate control. Cold borax for ½ a minute on the other hand appeared to give a good control. These treatments are not recommended at present, however, owing to the effect they have on the consistency of the fruit. Shirlan gave a good control, is simple to use and does not cause excessive wilting, fruit even after 40 days being still firm and plump. There is, however, a deposit left on the surface which would have to be rubbed off before the fruit could be exposed for sale.

It is hoped that further trials may be made on a larger scale during the present season.

A small trial was also made of the use of ordinary wrappers impregnated with iodine the effect of which is to give off a gas which is highly toxic to fungi. The fruit used was first quality for export and received exactly the same treatment as the rest of the consignment except that the packers were given impregnated wrappers. Three half cases were wrapped with the wraps. One half case of each was opened after 30 days and the remainder after 37 days.

The results were as follows :—

	Treated	*Untreated*
30 days	0.6% wastage	14% wastage.
37 days	0.0% wastage	24% wastage.

From this preliminary trial it appears that much wastage might be prevented by commercial use of these impregnated wraps. A further trial on a large scale on fruit exported to Europe is necessary before definite opinion as to their value can be given.

The Breeding and Management of Sheep in Cyprus.

BY J. P. MAULE, M.A., DIP. AGRIC. (CANTAB.), *Manager, Stock Farm,*
and
MUSTAFA SHEVKI, *Foreman, Stock Farm.*

1. INTRODUCTION.

SHEEP are kept in Cyprus primarily for the production of milk which, being the chief source of protein in the diet of the rural population, is, therefore, one of the most important foods of the Island.

In addition to the milk produced, sheep are of value for their fleece and for the production of lambs, the majority of which are slaughtered for eating.

The milk is mostly converted into various types of cheese and cheese products the commonest of which is " halloumi ", a soft cheese which is a favourite food of the population. The numbers of sheep in the different districts of the Island at the census taken this year (1935) compared with last year are as follows :—

	1935	1934
Nicosia and Kyrenia ..	82,571 ..	85,717
Larnaca	40,520 ..	40,268
Limassol	23,588 ..	20,917
Famagusta	89,127 ..	91,795
Paphos	39,500 ..	38,750
Total	275,486 ..	271,647

2. BREEDS.

(*a*) The type of sheep found in Cyprus is the fat-tailed breed which is also found in parts of Asia and North Africa and in particular is common in Palestine and Syria where it is known as " Awasi ". This type has been described in detail by Dr. S Hirsh in his paper "Sheep and Goats in Palestine," which was published in 1933. The Cyprus fat-tailed sheep usually has a white fleece and a white face without wool, but with black nose and black skin round the eyes; this is the commonest type and the one most preferred by shepherds. It is called in Cyprus " mavromata " (black eyes). A second common type is that with entirely black faces and called " mavropsa ".

Other types are :—

(1) Black and white faces in patches, white body called " stere ".
(2) Black, brown and white faces (mottled) and white body called " blumisti ".
(3) Brown faces and white bodies called " kokkinopsa ".
(4) Black or brown faces and bodies called " mavros " or " kokkinos ".
(5) Black or brown faces, neck and shoulders, rest of body white called " mavrolæma ".
(6) All white face and body called " aspropsa ".

The head is long and usually narrow and the ears are generally long, though some sheep have very short ears and are called " midi ". The ears are either black or white. The typical fat-tailed sheep is of medium height, with a long body and wide back ; narrow bodied sheep are usually the poorest. The legs are long and should be straight and strong and

are free from wool. The tail is thick and broad especially at the top but narrowing to the extremity There is a layer of fat at the top which gives the breed its name The tail is long and heavy and often drags along the ground due to its length and weight, and it has a characteristic twist in it. This twist may be either to the right or left but shepherds prefer rams to have the twist to the right. The rams usually have horns but not invariably and ewes seldom have horns. Rams are bigger and heavier than ewes and a good breeding ram should be a strong, vigorous and well grown animal The wool is long, coarse and of poor quality. It is carried from the neck to the tail and down the flanks but the face, legs, belly and the inside of the fat part of the tail is free from wool. The wool is used locally in small quantities but most of it is sold for export for the manufacture of coarse fabrics and rugs.

The fat-tailed breed of sheep can exist on very little food and make the best possible use of the naturally poor and scant grazing available. This breed can withstand both heat and cold and is remarkably hardy.

(*b*) The only other breed found in Cyprus is the merino, a few of which were imported from South Africa by the Government to the Stock Farm at Athalassa in 1926. These were crossed with the fat-tailed sheep and produced a crossbred type with better wool, shorter tails, without the usual twist, and with a brown face or a white face with brown markings. A small flock of these with a few surviving merinos is kept at Athalassa ; but they do not milk quite as well as the fat-tailed breed and the merinos are not milked at all, being entirely a wool-producing breed of sheep. They are not described in detail here as they are of no great importance in Cyprus at the present time

3 MANAGEMENT OF FLOCKS.

(*a*) *Grazing and Feeding* —The sheep are usually herded in flocks of from 40–80 including goats, under one shepherd. A few goats are always kept with a flock of sheep to act as leaders and moreover they will continue milking after the sheep are dry Owners of flocks of more than 30 or 40 sheep employ their own shepherd but owners of less than 25 to 30 sheep usually hire a shepherd who looks after the sheep of several small owners. He is paid 3 piastres per sheep per month to herd and tend these combined flocks Thus one such shepherd may look after the sheep belonging to a number of owners of different numbers of sheep

The sheep make their living almost entirely off the land, hand feeding being only used for fattening lambs or for ewes in time of great scarcity of grazing After harvest the flocks are grazed over the stubbles, picking up any fallen grain or straw and consuming weeds or any dry grass available. A great deal depends on the earliness or the rains, for, if the rains begin in October, there is the likelihood of early grass and better keep for the sheep at the beginning of the winter when lambing is due to begin.

Ewes begin coming in season during the summer so that lambing usually begins in November-December (see also paragraph 4 below). If the early rains fail then the sheep find very little to eat at this critical period of the year and it obviously has a detrimental effect on the lambs, which will be small and weak when born. They are grazed over the bare fallows during the early winter months picking up whatever there is to be had such as dry or green grass and weeds. If there is a great scarcity of food at this time, some flock owners feed a small quantity of barley and rovi chaff to the ewes when they return to the " mandres " at night. It is also believed that if the rains are early and grass plentiful

in October and November then the ewes come in season about one month earlier the following year (April–May) and if served then an early crop of lambs is obtained, which, provided food is again sufficient, will result in early fat lambs at Christmas. From January to March or April there is usually abundant green grass for the flocks and they may even run over the early cut green barley stubbles ; thus they should do well at this period of the year when milking is in progress. After April the grass dries off and they live on dry grass and weeds, etc., until the harvest is over when the same cycle begins again. The main point to note in this account of their management is that so much depends on the early growth of green feed in October to November, and that milking usually does not begin until there is sufficient green feed for the lambs to become, at least partly, independent of their mother's milk. If there is little rain until December or January, or if there is early rain and then a drought causing the grass to die off, both ewes and lambs suffer and the ensuing milking period is shortened.

Hand feeding sheep either to improve their condition, to increase milk production or to fatten them is rarely practised. Only in times of great scarcity and then only by a few shepherds, or to fatten a very small percentage of lambs as described in paragraph 5 below, is hand feeding practised. In favourable years hand feeding before lambing is probably not necessary but in other years a small amount of grain and bran at night fed to pregnant ewes would probably make a great deal of difference to the lamb when born and to the ewe herself in her ensuing milking period. Supplementary feeding of ewes just before weaning takes place and in the following weeks would very likely increase the ewes' milk yield, even if the quantity was very small, say ¼ ½ oke per day and in years when grass is not very plentiful some such feeding would probably be well repaid.

(*b*) *Sheep Pens.*—The provision of comfortable and dry pens for the sheep in the winter is of the first importance. In summer, from June to October, the flocks sleep out of doors with their shepherds on the arable land, but in winter they are brought into the pens or " mandres " usually in or near to the villages, at night. These " mandres " should be dry and protected from the wind and they should be roomy. It is unfortunately often the case that flocks are herded into pens in which they are overcrowded which often leads to losses among the flock. The fat-tailed sheep are more susceptible to wet conditions than to cold and it is a great mistake to let the flock sleep on wet ground. A suitable " mandra " is one built on rising ground, facing south, with a wall all round it ; inside it against one wall should be a covered over pen or inner yard to provide shelter from rain. The site should be selected as one not liable to flooding or collecting water ; a hard surface such as " havara " is ideal for the purpose. If flock owners and shepherds would take care not to keep more sheep than can be comfortably housed and looked after by one man greater success would be obtained.

4. LAMBING.

The lambing season varies considerably and depends very largely upon the shepherd and the method he adopts for managing his flock. Ewes come in season usually at one period in the year only and they will continue to come in season again if they do not prove in lamb at the first service, every 2–3 weeks for 2–3 months until they become in-lamb, unless they prove to be barren. Occasionally ewes come in season at 2 periods in the year, lambing during September and March.

Normally ewes begin coming in season at the end of May or June and continue until August. The period of gestation is 150 days or roughly 5 months so that ewes will start lambing at the end of October and continue until January or February. Ewes normally produce only one lamb a year, but a few have twins ; triplets are unknown in this breed. Early lambing in favourable years is usually a source of great profit to flock owners since the prices for early lambs are as much as 8*s*. to 10*s*. for a lamb 15–20 days old, and the price of milk at this time is about 10*cp*. per oke, all of which can be sold after the lambs have been disposed of.

5. REARING.

There are two main systems of rearing lambs : (1) a practice which is common in towns where there is a bigger demand for milk, is to sell the lambs at about 3 weeks old to the butcher, thus having all the ewes' milk for sale, and (2) is to keep the lambs until weaned and then either sell them or retain them for breeding. The time of weaning varies from about the 10th to 12th week and onwards depending on the weather and season. Lambs are usually weaned gradually by restricting the time allowed for suckling so that is also possible to begin milking the ewes before the lambs are fully weaned. The best of the young lambs are kept on every year for breeding. They are usually the early born lambs ("proma") which are the strongest. Those lambs that are not sold off at 3 weeks and not to be retained for breeding are usually weaned and then fattened for slaughter at from 4 to 8 months. The late born lambs ("opsima") are often weak and are nearly always sold. A small number of lambs usually rams, are hand-fed after weaning and are not allowed to graze with the flock. These are called "besli". They often belong to women who have, perhaps, bought one young, in order to fatten and sell it at a profit. They are usually sold when they are 6–7 months old. Rams are not used for breeding until over 2 years old, but rams over 4 years are preferred. The young ewes are mated when they are nearly one-and-a-half years old ; *i.e.* they will lamb for the first time when approximately 2 years old.

6. REPLACEMENT AND DISPOSAL OF STOCK.

(*a*) *Replacement.*—Every year a certain number of ewes are culled (discarded) and sold, either because of their age, because they are barren, because they are naturally poor milkers or because they have damaged udders and do not milk satisfactorily. Usually only ewes over 7 years are sold on account of age and these and those that are barren probably represent 10% to 15% of the flock ; another 5% to 10% may represent the poor milkers, making a total of 15–25% replacements among ewes. Breeding rams are usually sold when they are 8–10 years old.

(*b*) *Disposal of Lambs.*—The following table shows the approximate percentage of lambs either sold young, weaned or retained for breeding in different districts :—

TABLE I.

District	*Sold (or die) young*	*Weaned and sold fat*	*Retained for breeding*
Nicosia	75	10	15
Larnaca	65	15	20
Kyrenia	70	5	25
Paphos (plains)	50	10	40
Paphos (hills)	—	85	15

Except in the area around the coast in Paphos District the figures show that 75-85% are sold and only 15–25% retained for breeding.

7. MILK PRODUCTION.

(*a*) *Milking Period.*—The lactation period lasts for 6–7 months including the period in which the lambs are suckling the ewes. With early lambing and good conditions the longer period is obtained, *i.e.* from November until May. In towns, as previously explained, the lambs are sold at about 3 weeks and milking begins then and is done twice a day. In villages where there is less demand for milk, milking does not begin until the lambs are 2 months old, it being done once a day until the lambs are 3 months old and able to be weaned completely, when regular twice a day milking is begun. Milking may go on until the beginning of June but this is rare, the normal period in which the ewes are milked by hand lasts for from 80–170 days, with an average period of approximately 3½–4 months (100–120 days).

(*b*) *Method of Milking.*—The ewes are milked from behind into a tin or special earthernware vessel, ("galevtiras"), placed on the ground. One man does the milking while another man drives the sheep from the yard to the doorway where the milker sits. Each ewe is milked in turn and then passes out through the door of the "mandra". This is obviously a very dirty way of milking sheep and in order to improve on it a raised milking stand was made at Athalassa with a sloping platform up which the goats and sheep run to reach the stand. The stand has wooden bars at the side and front to prevent the ewe jumping off. The front bars can be opened when milking is finished to let the ewe run down a platform corresponding to the one at the back. The ewes and goats soon learn to run up of their own accord and stand quietly but a little food in a tray at the front encourages them to stand quietly Milking is done from behind and is much cleaner and is easier for the shepherd than the normal way.

(*c*) *Milk Yields*—The average yield of milk per ewe varies from 20 up to 60 okes for a period of from 80-170 days depending on the district and the season * In Paphos and Kyrenia districts the yield is said to be from 20–30 okes for 80–110 days and in Nicosia and Larnaca Districts the average yield is given as 55-60 okes for a period of 120–170 days. Ewes that give an average of ½ oke (nearly 1½ lb.) per day are considered good milkers and at the beginning of the milking period good ewes should give 1 oke per day

Milk recording was begun at Athalassa last year and the following table shows the yields of native ewes under different conditions of management.

TABLE 2.

Average yield per ewe	No. days milked	Yield okes	Yield lb.	Av. yield per day drams
When lambs were sold early	96	43.4	121.4	180
,, ,, ,,	138	60.8	170.25	175
When lambs suckled for approximately 4 months (once a day milking)	70	26.4	74	120
When lambs were sold after 4 months and ewes milked for a further period of 42 days	112	38.2	106.8	135

* 1 oke of milk equals to 2.8 lb. or a little more than a quart.
1 oke equals 400 drams and 1 lb. equals approximately 145 drams.
10 lb. equal 1 gallon equals 3½ okes approximately.

Three ewes that were milked for 162 days gave yields of 80, 64, and 62 okes respectively; the second of these being a crossbred ewe. The crossbred (Merino-Cyprus) ewes did not on the whole milk as well as the native ewes. They averaged 36–48 okes when the lambs were sold early; 24 okes when lambs suckled all the time and 36 okes when the ewes were milked on after the lambs were sold at 4 months (corresponding to the periods in Table 2).

The milk of fat-tailed sheep is rich in fat and according to Dr. Hirsh it is between 6–8%. The average yield of Palestine "Awasi" sheep is also given by him, the average for the country being said to be 40 litres or 31 okes, under specially favourable conditions average yields of 63.5 litres or 50 okes have been obtained.*

8. DISPOSAL OF MILK FOR CHEESE MAKING.

A certain amount of fresh milk is consumed, especially in towns, but by far the largest proportion is made into cheese, and other products. The price of milk is high at the beginning of the winter and gradually falls until the end of the season. In October the price may be as high as 10*cp* an oke (6*d* per pint) but it gradually falls to 2*cp* per oke (1¼*d*. per pint). Many sheep owners contract to supply all their milk to cheese making establishments in return for a small advance. The price they are paid under their contract may be as low at 1¼*cp* per oke (½*d*. per pint). The commonest type of cheese is called "halloumi". It is a soft cheese, peculiar to Cyprus, and is used almost entirely for local consumption. It is made from either sheep's and goats' milk or a mixture of both and from 5–7 okes of milk will make one oke of "halloumi". In and around towns there are regular cheese making establishments, but in the villages the usual practice is for all the sheep owners to agree to give all their milk to each other in turn. The number of days that each man gets all the milk in this way is decided according to the number of sheep each one owns. Thus the man with most sheep may get all the milk 6 days a month, others 5 or 4 days a month and so on. In this way every facility is given to each man to make all the cheese that he could anticipate making in a month, in a few days or even one day. The price of "halloumi" varies during the year being about 20*cp*. per oke at the most and falling to 9*cp* per oke later on. Other types of cheese (*e.g.* "kaskavalli" and "kefalotiri") are made both for local consumption and for export and such products as butter, "yiayourt," "anari," "mahallebi" and "trachanas" are manufactured from sheep's milk. The method of manufacture of all these will be described in a separate leaflet.

The estimated production of butter and cheese in 1934 was as follows:—

Butter 21,251 okes (531 cwt.).
Cheese 683,284 okes (17,082 cwt.).

9. WOOL PRODUCTION.

Shearing the sheep takes place in the spring in April or May. It is all done by hand clippers and in fine weather. When possible the sheep are washed before shearing and if the wool is required for local use it is washed again after shearing but that not required for local manufacture is sold without any special preparation. Wool is used locally for making jerseys, blankets, shirts and such like articles of clothing by the village women. But only a small proportion of the total clip is used in this

* "Sheep and Goats in Palestine"—Dr. S. Hirsh.

way, the majority of owners preferring to sell their wool to merchants for cash. Such wool is mostly exported to Europe and America for manufacture of coarse fabrics and rugs as it is too poor in quality to be of any use in making clothing.

The weight of wool obtained from the fat-tailed sheep at Athalassa, which are probably representative of the Island is as follows :—

Ram $1\frac{3}{4}$ okes (4.9 ℔.).

Ewe $1\frac{1}{4}$ okes (3.5 ℔.).

The crossbred sheep give rather heavier fleeces but the quality is very mixed ; rams yield from $2\frac{1}{2}$–$2\frac{3}{4}$ okes (7–$7\frac{3}{4}$ ℔.) and ewes $1\frac{3}{4}$ up to $2\frac{1}{4}$ okes (4.9–6.3 ℔.).

The price of wool in 1934 varied from 6*cp.* to 10*cp.* per oke and the total production was 244.988 okes. Care is necessary after shearing that the sheep do not get wet and the shepherds always graze their flocks near to villages or pens for about a fortnight after shearing in order that they can shelter quickly if rain comes on.

10. DIPPING AND DISEASES.

(*a*) *Dipping.*—Dipping of sheep in cement tanks was not extensively practised in Cyprus until the recent drought (1931–33) when losses among sheep due to debility and heavy infestation of external parasites increased considerably. Since then dipping has become increasingly popular and there are now 42 baths in the Island and many new baths will be constructed shortly. Dipping is done every 3–4 weeks and is carried out practically all the year round except for a short period from October to January when ewes are heavy in lamb The object of dipping sheep in a solution of Arsenic is to kill all external parasites such as ticks and lice, and to prevent ewes losing condition and becoming debilitated as a result of infestation. In consequence it gives the sheep an improved resistance to disease in general and it also tends to keep the wool clean and thus improve its value. Plans of suitable sized baths for different localities can be obtained from the Veterinary Service Headquarters and from all the Stock Inspectors.

(*b*) *Diseases.*—The most important diseases of sheep in Cyprus are the following, but a detailed account of these will be described in a separated leaflet to be written by the Chief Veterinary Officer.

1. *Anthrax.*—This was once the greatest source of loss among sheep but as a result of the annual vaccination the losses in sheep are now almost negligible.

2. *Internal Parasites.*—The sheep stomach worm, especially, is responsible for many losses among sheep as it causes great debility and weakness resulting in their death.

3. *Sheep-pox.*—Occasional epidemics usually of a mild nature but sometimes causing heavy losses.

4. *Infectious Labial Dermatitis* (*Anemovloyia*).—Losses from both this disease and the previous one are considerably less in flocks that are well looked after.

5. *Sheep Nostril Fly.*—This prevents sheep grazing and consequently causes weakness and loss of production.

11. MARKING AND RECORDING.

This is a subject which so far has not been practised in any systematic way in Cyprus, with the exception that most sheep are marked by their owners with a simple cut or slit in one or both ears to indicate ownership. The numbering of ewes in sequence in order to record the order in which they are served, and thus know when each is due to lamb would, no doubt, be of great benefit to shepherds In the same way shepherds would be able to remember and identify the best ewes in the flock and in many cases select the lambs of such ewes for breeding.

There are 3 suitable methods of marking sheep :—

(1) By tattooing in the ear.

(2) By fixing small numbered clips in the ears.

(3) By clipping out the ears at different points to indicate different numbers or different classes of sheep. The Veterinary Service has experimented with each method of marking, and is continuing to experiment with different types of ear clips : while at Athalassa all sheep are now being numbered in this way and their individual history and performance recorded in a book Thus it is possible to select only the ewes of the best quality as well as the best type and to rear the lambs of these ewes for breeding

12. CONCLUSION.

In conclusion it should be borne in mind by all students and those interested in the keeping and management of sheep, that only by proper care and attention to the flock, and by the selection of the best type of rams and ewes can improvement be attained. Care is necessary at lambing time and in rearing the lambs, in providing comfortable and spacious pens in winter, in discarding the worst and least profitable sheep, and at all times in keeping the sheep healthy by following the advice of the Veterinary Officers.

By selection of the best ewes for breeding and by the use of a ram of the best type, a sound and profitable flock can be built up and the production of milk per head would probably be increased in a few years. This would both enrich the flock owners and would benefit the Island by increasing the export of cheese to other countries, the revenue from which is already quite an appreciable amount.

Trials of Silkworm Eggs.

EXPERIMENTAL silkworm rearings were carried out at the Agricultural Department's Sericultural Station at Kalopanayiotis during the spring of 1935 to compare the production of cocoons obtained from silkworm eggs produced in different places.

For the purpose of this experiment silkworm eggs were obtained from five different sources :—

(A) Eggs from those produced in the Sericultural Station the previous year and the result of two years selection in that Station.

(B) Eggs produced by the largest producer in Cyprus

(C) Eggs produced by one of the smaller producers in Cyprus, whose rearings are carried out under less favourable conditions than those of (B).

(D) Eggs imported from France by a merchant and sold to rearers in Cyprus

(E) Eggs imported from France by another merchant and from a different producer from those in (D), and sold to rearers in Cyprus.

The five kinds of eggs are referred to by the above letters in the remainder of this article

From each of these five different lots of eggs five separate rearings of ½ dram of eggs were carried out, so that altogether there were 25 rearings of ½ dram each. Each of these rearings was given a number and none of those engaged in the care and feeding of the rearings knew from which of the sources the separate rearings came

Owing to the smallness of the rooms of the Sericultural Station it was necessary to use four rooms for the later stages of the rearings, but these all opened from one large hall and care was taken to keep the conditions as regards feeding, temperature etc, as uniform as possible. The separate rearings of each kind of eggs were not numbered consecutively nor kept together so that as far as possible the rearing conditions were the same for each of the five kinds

All the eggs were put in the incubator at the same time, but a little difference was observed in the hatching, (A) being rather later than the others (11 to 13 days incubation), and (C) and (E) rather earlier (8 to 10 or 11 days incubation) In all lots there was a proportion of eggs which failed to hatch but this was small in four of the varieties (smallest in (A)) but larger in (C). This less satisfactory hatching of (C) eggs would have some effect on the total production of cocoons by (C), but does not entirely account for the less satisfactory production obtained from these eggs.

The time occupied from the hatching to the commencement of spinning the cocoon did not vary greatly between the different varieties, all spinning commencing between 40 and 43 days from the commencement of hatching.

Differences were obtained between the weight of cocoons produced in all cases, but taking the average production by each of the five lots of similar eggs it is possible to obtain a considerably more accurate indication of the real difference between the five varieties of eggs than would have been the case had all the eggs of each variety been reared together. The actual yields obtained, calculated as okes of cocoons per ounce of eggs, were as follows :—

(A) 48 okes 288 drams.	(D) 44 okes 256 drams.
(B) 49 okes 304 drams.	(E) 44 okes 32 drams.
(C) 40 okes 160 drams.	

By comparing statistically the yields obtained from each of the five lots of each of the five varieties it is found that the differences between (A) and (B) and between (D) and (E) are too small to be considered as due to a real difference in the quality of the eggs, but all the other differences are probably due to actual differences in the eggs.

It thus appears that the eggs (A) which have been produced by the Agricultural Department as a result of careful selection, and those (B) supplied by the largest local producer, may be considered as equally good and likely to give a better production than any of the others. The two kinds of imported eggs (D) and (E) are also practically equal as regards production, but appear less productive than (A) and (B), while the eggs (C) produced in Cyprus under less satisfactory conditions can not be relied upon to give as good a production as any of the other kinds.

It should be remembered, however, that these results were obtained at Kalopanayiotis and may not entirely apply to other areas of the Island where conditions are different.

It is well worthy of note that the average production obtained was over 45½ okes of cocoons per ounce of eggs, and even the eggs giving the smallest production gave almost 40½ okes of cocoons per ounce of eggs, compared with the average of about 24 okes obtained by rearers throughout the Island, thus showing the advantage obtained from the more careful treatment and better conditions under which the rearing was carried out. It may also be mentioned that the average production in 105 girls' schools during the 1935 season, was 45 okes of cocoons per ounce of eggs, these eggs being supplied by the Agricultural Department and being similar to the (A) eggs used in this experiment.

The results of this experiment also support the opinion that eggs of better quality are produced by those who undertake the production of large quantities of eggs, and support the policy of the Agricultural Department during recent years in only issuing licences for egg production to producers who undertake to produce at least 100 ounces of eggs. Such producers, whose rearing is on a comparatively large scale and who anticipate receiving a substantial sum from the sale of their eggs, are naturally inclined to pay more attention to their rearing and in consequence to supply better produce.

Demonstrational Silkworm Rearing in Girls' Schools, 1935.

FOR several years past the Agricultural Department in co-operation with the Education Department has made arrangements for conducting demonstrational silkworm rearings in Girls' Schools with the object of teaching the growing generation the best methods of silkworm rearing, and of demonstrating these methods to the community and so improving the general rearing of the worms, and also demonstrating the higher rate of production obtained from eggs reared under the improved methods.

Usually one dram of eggs is hatched out in each school, the eggs being issued by the Agricultural Department free of charge. The school is supplied with the required layers, incubator, thermometer, etc.

Demonstrational rearings were carried out during 1935 in 97 Orthodox-Christian and 13 Moslem Girls' Schools where about 1,400 girls attended the rearings and acquired a useful knowledge of sericulture.

The maximum production obtained was 76 okes of cocoons per ounce of silkworm eggs and the average for 105 schools was 45 okes.

Prizes have usually been given by the Agricultural Department to a certain number of schoolmistresses who carry out the best rearings, but this year, in order that a greater number of schoolmistresses might be rewarded for their efforts in carrying out demonstrational silkworm rearings, it was decided to give a prize of £1 to the best school in each district and a large number of prizes of 10s. each to schools which attained a certain standard of production, instead of awarding a smaller number of larger prizes. This new method of awarding the prizes will be continued next season.

The Agricultural College Old Students' Club Cup for the year 1935 has been awarded to the Girls' School of Ayios Epiktitos (Schoolmistress Miss Phroso Panayi) which obtained the highest production of cocoons. (76 okes of cocoons per ounce of silkworm eggs.)

Prizes for 1935 were given by the Agricultural Department in co-operation with the Education Department to the following schoolmistresses :—

PRIZES OF £1 IN EACH DISTRICT.

Nicosia District.

Lefka : Zekhra Nerber, Handan Moustapha, Nizither Halid.

Larnaca District.

Mazotos : Phroso Nikolaou.

Limassol District.

Episkopi : Zekhra Kiouzitè.

Famagusta District.

Famagusta : Akkilè Moullahoussein, Fatma M. Tayer, Mousgan Yusuph.

Paphos District.

Emba : Elli Papadopoullou.

Kyrenia District.

Ayios Epiktitos : Phroso Panayi.

PRIZES OF 10s. EACH.

Nicosia District.

Akaki : Lysimakhi Petraki.
Alona : Valentini Theokharidou.
Ayios Dhometios : Eleni Dimitriou, Despo Skolarikidou.
Ayii Omoloyitadhes : Kalliroi Kyprianou, Maria Papandreou.
Ayia Varvara : Maria Xenophontos.
Dheftera, Pano : Thekla Skolarikidou.
Elea : Fatma Ali.
Engomi : Loukia Yeoryiou.
Kaimakli. Christalleni Yeoryiou, Anastasia Dimitriadou, Zoe Gregoriadou, Eleni Michaelidou
Kambos : Eleni Yeoryiou.
Korakou : Eleni Kramvi.
Kythrea (Khardakiotissa) : Zoe Nikolaou
Kythrea (Ayia Marina). Despina Karadja, Kallistheni Konstantinou.
Lakatamia, Pano : Evanthia Konstantinou.
Linou-Phlasou · Ioulia Kyrmitsi.
Lythrodhonda : Alexandra Pantelidou
Morphou : Theodhora Ioannou, Christ Cristodoulidou, Sevasti Konstantinidou, Phroso Limnatou, Katina Kyrmitsi, Eleni Pantazidou.
Nicosia (Ayia Sophia) · Talia Ali, Havva Zishan, Mevhilè Dilara, Mauridè Nebile, Sevvet Omer, Takè Dervish.
Palekythro : Eleni Dionisiou
Palliouriotissa. Katina Eliadou, Maria Ioannou.
Platanistasa · Ioanna Physentzidou
Pera : Elli Yeoryiou.
Pera Khorio : Kallistheni Kyriakou.
Petra : Androniki Yeoryiadou.
Psomolophou : Elli Papadopoullou.
Tymbou : Dorothea Louka.
Xeri : Euridiki Christophoridou.

Larnaca District.

Ayios Theodhoros (Orthodox-Christian) · Erato Savvidou.
Ayios Theodhoros (Moslem) : Siddika Tedjelli.
Kalavasos : Androniki Konstantinou, Demitra Frangou.
Khirokitia : Ioanna Fandi.
Kiti : Katina Konstantinidou.
Larnaca : Seidè Nihiar.
Lefkara, Pano : Augusta Kyprianou, Polyxeni Savvidou, Photo Michaelidou, Maria Zakhariadou.
Livadhia : Kallistheni Chrysostomou.
Maroni : Polyxeni Harmanda.
Ormidhia : Eutikhia Savvidou.
Perivolia : Kika Venardi.
Skala : Hiftiyè Ahmed, Meliha Houloussi, Meil Omer, Fatma Hakki, Zishan Mehmed.
Tokhni : Katina Iakovou.

Limassol District.

Agros : Yeoryia Poullidou, Ismini Poullidou.
Asgata : Iphiyenia Kazamia.
Dhora : Chrysanthi Droushoti.
Episkopi : Ioulia Voreadou
Kalokhorio : Myrianthi Charalambous.
Kilani : Antigoni Christou.
Kolossi : Margarita Christodoulidou.
Limassol . Hattidjè Ahmed Refik.
Perapedhi : Ioanna Djimboushi.
Pyrgos : Maria Papakonstantinou.
Vasa (Kilani) : Eleni Zakhariadou.
Yermasoyia : Chrystalla Haji Yeoryiou.

Famagusta District.

Ayios Theodhoros : Photini Ioannou.
Ayios Andronikos . Zoe Kondou.
Ephtakomi : Olga Michael, Melpomeni Nikolaidou.
Koma tou Yialou Panayiota Papakonstantinou.
Leonarisso Iphiyenia Zisimou.
Rizokarpaso : Eleni Christophorou, Photini Papadopoullou, Maria Lazaridou, Athina Mouski, Andriani Ioannou.
Sinda : Laika Imbrahim.
Trikomo · Persephoni Nikolaou, Anastasia Pavlidou.
Vatili . Agathi Nikolaou.
Yialousa : Zoe Kondarini, Evdhomi Dimitriou, Yeoryia Theodhoridou Elenitsa Kyprianou
Yialousa (Ayia Trias) : Chrystalleni Zorpa, Athina Loizou.

Paphos District.

Dhrousa : Angeliki Charalambous
Kelokedhara · Ioanna Paskhalidou.
Khoulou . Phlorendia Kyprianou.
Ktima . Katriè Houloussi.
Lyso · Ourania Damali.
Neokhorio : Anna Stylianou.
Peyia . Ioanna Christou.
Polemi . Maria Kyprianou.
Polis : Chrystalleni Theodhoridou.
Tsadha : Maria Petridou.
Yeroskipos : A Dinglis, S. Skordis (Schoolmasters).

Kyrenia District.

Ayios Amvrosios : Korallia Ekonomidou.
Bellapais : E. Pyteridou.
Dhikomo : Eleni Stavridou, Polyxeni Michael.
Dhiorios : Eleni Konstantinou.
Kalogrea : Charitini Konstantinou.
Karavas · Maria Karadja, Olga Konstantinou, Eleni Karadja.
Kyrenia · Zekhra Aliriza.
Lapithos (Orthodox-Christian) : Eupraxia Anastasiou, Stavrini Konstantinou, Antigoni Louka, Euterpi Ellinopoullou.
Lapithos (Moslem) : Fikriè Houssein.
Larnaka tis Lapithou : Christ. Koutouri.
Sisklipos : Phrini Nikolaou.
Vasilia : Maria Harmanda.

A Brief Review of Tree Planting in the 1934–35 Planting Season.

IT is gratifying to record that the interest and activity which has of late been displayed in tree planting was well maintained during the 1934–35 season in all districts of the Island A total of 176,874 trees were planted as well as 1,191 donums of vines. The fact that about 50% of the total was planted in areas other than tree planting areas makes the effort none the less commendable.

The benefits to be derived from tree planting and tree cultivation are many, but among the chief ones may be mentioned . (*a*) The production of direct revenue to the grower by crops which may be cashed ; (*b*) The provision of fuel ; (*c*) The prevention of erosion and soil improvement , (*d*) Protection of other crops from wind damage (windbreaks and shelter belts) , and (*e*) The provision of shade for man and animals.

A statement is given on pages 103–104 of the number and kind of each kind of trees planted in the various areas of the Island in 1934–35. (Citrus and vines are given in donums). From this statement it will be seen that rather more than 50% of the total trees planted were set out in areas declared under the Tree Planting (Village Areas) Laws, 1930 and 1935. This percentage of trees planted in reserved areas may be rather lower than expected, but it must be remembered that many of the areas have only recently been declared, and that in some areas which have been declared for a number of years there has, until recently, been a certain lack of confidence as to the efficiency of the Law for controlling depredations of flocks, for not unnaturally the shepherds, as a class, are strongly opposed to the tree planting movement It is hoped, however, that with the new Licensing of Shepherds Law greater control of grazing will be achieved bringing as a consequence increased confidence to tree-planters under the Tree Planting Law

Another difficulty confronting villagers who were prepared to plant trees under the Law has been the lack of trees to plant. This is especially true of recently declared tree planting areas. Efforts are, however, being made by the Department to overcome this shortage and large quantities of seed and planting material have been and are being issued. The demand for trees from nursery gardens and school gardens continues at a very high level and many thousands of trees have been supplied. Village Agricultural Clubs are also turning attention to nursery work with a view to providing planting material. In addition a number of wild olives have been extracted from the forests by arrangement with the Forest Department, for planting in village lands with a view to grafting later with known varieties.

There are now 57 areas declared under the Tree Planting Law 27 only of which were reserved prior to the commencement of the planting season under review.

The existing tree planting areas in each district are given below :—

Nicosia District :
Pera
Orounda
Argaki
Kato Kopia
Peristerona
Morphou
Episkopio
Mitsero
Akacha
Platanistasa
Paleokhorio
Paleokhorio (Dagh)
Vyzakia
Dhali
Pera Khorio
Kalopanayiotis
Ayios Epiphanios
Aradhiou
Potami
Korakou
Lymbia
Alona
Ambelikou
Alambra

Famagusta District :
Lefkoniko

Larnaca District :
Athienou

Kyrenia District :
Kazaphani

Limassol District :
Pissouri
Pelendria
Ayios Mamas
Ayios Ioannis
Agros
Pano Kividhes
Mandria
Perapedhi
Phasoula
Lania
Dhoros
Kapilio
Ayios Athanasios
Alektora
Apsiou

Paphos District :
Stroumbi
Statos
Ayios Photios
Pendalia
Galataria
Letymbou
Kathikas
Polis
Kelokedhara
Pano Panayia
Arminou
Ayios Ioannis
Ayios Nicolaos
Mesana
Kedhares

The tree most widely planted during the past season in Tree Planting Areas was the almond, 152, 350 having been planted. Forest trees are second in popularity (planted with the idea of providing fuel) and large numbers of vines have also been planted.

Of the trees planted in non-reserved areas almonds are again the most popular, but large areas of citrus and vines and considerable numbers of olive trees and forest trees have also been planted.

Apart from private planting, planting has been undertaken on a village scale in some districts. There has also been activity in planting by schools on land set aside for the purpose by village school authorities and by Village Agricultural Clubs.

It is unfortunately impossible at this stage to give an estimate of the percentage of trees which actually survive after planting. Undoubtedly, at present, this is not very high but as the population becomes more "tree conscious" it is thought that an improvement will be automatically effected in this respect. The fact that tree planting has been taken up with enthusiasm by the rising generation is a happy augury for the future of this important branch of Cyprus agriculture. B.J.W.

TREES PLANTED IN 1934–35 (TREE PLANTING AREAS).

District or Sub-District	Vines donums	Citrus donums	Almonds No.	Carobs No.	Olives No.	Apples No.	Pears No.	Plums No.	Apricots No.	Peaches No.	Cherries No.	Quinces No.	Walnuts No.	Loquats No.	Forest No.	Figs No.	Other Fruit No.
Limassol	215	—	9,000	—	—	50	60	—	100	—	50	—	30	—	—	—	—
Famagusta ..	10	—	3,850	—	194	—	—	—	—	—	—	—	—	—	9,670	—	55
Nicosia	—	—	50,000	—	500	—	—	—	100	—	—	—	—	—	8,000	1,000	400 (Mulberries)
Kyrenia*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Paphos	617	—	44,800	—	—	—	—	—	—	—	—	—	—	—	—	—	960
Larnaca	40	—	—	400	—	—	—	—	—	—	—	—	—	—	—	—	—
Nisou	54	—	4,000	—	—	—	—	—	—	—	—	—	—	—	1,000	—	—
Agros	235	—	33,700	—	—	915	225	70	210	340	480	230	335	—	—	—	—
Lefka	20	—	6,000	—	—	—	100	—	—	—	—	—	—	—	—	50	—
Total	1,191	—	151,350	400	694	965	385	70	410	340	530	230	365	—	18,670	1,41	1,050

Total number of trees planted in Tree Planting Areas (other than vines and citrus) .. 176,874
Vines donums 1,191
Citrus donums .. .. —

* No Tree Planting Area reserved at the time of taking statistics.

TREES PLANTED IN 1934-35 (OTHER THAN TREE PLANTING AREAS).

District or Sub-District	Vines donums	Citrus donums	Almonds No.	Carobs No.	Olives No.	Apples No.	Plums No.	Apricots No.	Peaches No.	Cherries No.	Pears No.	Quinces No.	Walnuts No.	Loquats No.	Forest No.	Mulberries No.	Other Fruit No.
Limassol	347	1,836	4,440	150	600	220	—	970	—	—	80	—	20	—	—	—	—
Famagusta ..	710	1,154	15,830	780	5,286	—	—	—	—	—	—	—	—	—	30,550	4,630	4,785
Nicosia	—	100	4,000	—	2,000	—	—	400	1,000	—	—	—	—	—	4,000	3,000	500 Figs
Kyrenia	—	31	1,300	—	100	—	—	1,300	—	—	—	—	—	—	—	300	500
Paphos	3,590	—	123,500	—	—	—	—	—	—	—	—	—	—	—	—	—	15,956
Larnaca	1,220	72	16,300	2,430	5,965	210	50	1,340	—	—	80	—	280	1,010	—	—	—
Nisou .. .	244	69	615	50	1,965	—	—	120	—	—	—	—	—	—	7,810	—	—
Agros .. .	555	2	29,940	—	150	523	75	520	120	280	408	1,370	980	—	—	—	—
Lefka .. .	316	63	36,723	840	3,944	600	180	1,070	—	60	360	—	110	—	1,040	1,981	1,550 Figs
Total	6,982	3,327	232,648	4,250	20,010	1,553	305	5,720	1,120	340	928	1,370	1,390	1,010	43,400	9,911	23,291

Total number of trees planted other than in Tree Planting Areas (other than vines and citrus) 347,246

Vines donums 6,982

Citrus donums 3,327

Vine By-products.

BY P. ANTONIADES, *Viticulturist and Wine Expert.*

MARC.—Vine marc is the refuse remaining after the pressing of the grapes. Very little use is made of this by-product in Cyprus. In a number of the vine-growing villages the marc is distilled and a certain amount of alcohol extracted but in most villages the marc is thrown away as useless even before it is distilled. Vine marc is of considerable value as a fertilizer and may also be used as a cattle food.

As a fertilizer its composition compares favourably with that of farmyard manure, and it contains 0.80% nitrogen, 0.35 phosphoric acid and 0.63% potash. Marc used as a fertilizer will return to the soil the ingredients which have been used by the vine and it is, therefore, a most suitable fertilizer for the vineyard and should not be discarded and left to waste.

As a feeding stuff for cattle it possesses considerable nutritious value, even after distillation for the extraction of alcohol It contains 3% protein, 2% fat and 17% carbohydrate. One hundred okes of marc are considered to be equivalent to 35.36 okes of good hay or 28 okes of lucerne.

Various by-products can be produced from the marc under industrial conditions, but such production is out of the scope of the village wine producers

If vine marc is to be utilized either as a fertilizer or a cattle food the following processes are recommended.

As a fertilizer it is advisable to prepare a compost. The acidity should first be neutralized by allowing the marc to be undisturbed in a heap for several days to allow the moisture to drain off. The marc is then spread out in a layer 10″ to 12″ thick On the surface of this layer, place 2% sulphate of potash and 2% phosphate, then irrigate the layer with liquid artificial manure consisting of sulphate of ammonia 2.5%, lime 1.2% and water 100%.

Further layers of marc and treated in the same way are placed on top of the first layer until the heap is 6′ high when it is left to ferment. After one month the heap should be thoroughly mixed and again placed in a heap when fermentation re-starts. After two to three weeks fermentation should cease and the material is ready to use as a fertilizer. The manure should be applied at the rate of 2 to 2½ okes per vine.

When preparing marc as a feeding stuff, it should be made into silage. Marc silage is prepared in the same way as maize or other green food silage. The marc silage may be made more appetizing by the addition of 5% salt when it is first placed into the silo.

VINE SHOOTS.—After pruning the vine shoots are invariably used in Cyprus as a fuel. These shoots may also be used as a fertilizer and prepared into a compost in the same manner as marc.

The manurial value of vine shoots is stated to be as follows :—

Nitrogen	0.57	Lime	1.38
Phosphoric acid ..	0.23	Magnesium ..	0.12
Potash	0.94		

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

SEPTEMBER, 1935.

District and Station	Shade temperature		Rainfall				
	Mean						
	Maxim.	Minim.	Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	91.83	64.37	0.12	1	0.12	0.27	
Athalassa		—		—	—	0.58	—
Morphou		—				0.18	
Makheras						0.19	
Famagusta District :							
Famagusta	92.53	67.53	1.04	2	0.55	0.22	—
Akhyritou	90.90	66.00	0.16	1	0.16	0.18	
Rizokarpaso ...		—	0.65	2	0.35	0.25	
Lefkoniko		—	0.20	1	0.20	0.31	
Larnaca District :							
Larnaca	91.00	66.00	0.01	1	0.01	0.40	
Lefkara	—		—	—	—	0.61	
Limassol District :							
Limassol	88.70	65.33	0.07	1	0.07	0.33	
Saittas					—	0.91	
Trikoukkia... ...	72.30	53.10	0.75	1	0.75	0.92	—
Alekhtora	—					0.14	—
Paphos District :							
Paphos	81.70	72.30	0.30	2	0.20	0.15	
Polis...	—		0.75	2	0.65	0.34	
Kyrenia District :							
Kyrenia	87.73	69.13	0.16	1	0.16	0.30	—

OCTOBER, 1935.

District and Station	Maxim.	Minim.	Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District.							
Nicosia	83.45	59.68	1.03	6	0.78	0.58	
Athalassa	.		1.17	3	0.82	0.61	
Morphou	—	—				0.29	
Makheras	—	—	3.50	2	2.50	0.86	
Famagusta District :							
Famagusta	85.40	61.60	3.51	3	2.45	0.84	—
Akhyritou	83.10	59.90	2.97	3	2.09	0.68	
Rizokarpaso ...			2.74	2	1.91	0.79	
Lefkoniko		—				0.41	—
Larnaca District :							
Larnaca	86.00	62.00	2.05	5	1.29	0.84	—
Lefkara	—		2.78	4	1.65	0.91	—
Limassol District :							
Limassol	83.39	60.48	2.94	5	1.74	0.83	—
Saittas	—		4.43	6	2.47	0.67	—
Trikoukkia	66.17	50.07	6.55	6	3.30	1.79	—
Alekhtora	—	—	2.60	2	1.50	0.82	—
Paphos District :							
Paphos	—	—	2.68	4	1.53	0.88	—
Polis...		—	2.60	2	1.50	0.94	—
Kyrenia District :							
Kyrenia	81.60	66.33	2.16	4	1.11	0.77	—

Note.—Compiled from returns furnished by Public Works Department.

NOVEMBER, 1935.

District and Station	Shade temperature Mean Maxm.	Minm.	Rainfall Total inches	No of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District:							
Nicosia	67.23	48.97	3.02	10	1.10	1.14	—
Athalassa			1.92	6	0.79	0.95	
Morphou			--		-	0.87	
Makheras	--		6.24	5	2.15	2.05	--
Famagusta District:							
Famagusta	72.33	51.97	4.23	7	1.40	1.72	
Akhyritou	68.30	49.30	2.65	7	1.18	1.26	
Rizokarpaso ..	—	--	5.10	8	1.15	2.69	
Lefkoniko			1.49	4	0.70	1.25	
Larnaca District:							
Larnaca	70.00	52.00	2.81	9	0.90	1.69	-
Lefkara ...			4.93	8	2.10	2.64	
Limassol District:							
Limassol	70.90	51.93	3.13	13	0.84	1.85	
Saittas	-		4.36	8	2.18	1.36	
Trikoukkia	50.83	38.03	4.25	9	1.45	1.89	
Alekhtora . ..		--	6.26	8	1.52	1.99	
Paphos District:							
Paphos		-	3.31	6	1.00	2.15	
Polis.	-					1.60	
Kyrenia District:							
Kyrenia	69.26	55.50	4.41	11	1.07	2.61	—

Note.—Compiled from returns furnished by Public Works Department

NOTICE

THE DIRECTOR OF AGRICULTURE is prepared to consider offers for the purchase of two threshing machines complete with tractors and spare parts.

The machinery offered consists of —

1 —(*a*) A 3′ 6″-drum Garrett, portable power threshing machine

(*b*) A 28–32 h.p.-Rushton Agricultural tractor suitable for driving and hauling the Garrett thresher.

(*c*) Spare parts for thresher and tractor.

The above machinery is in good working condition and has been used three threshing seasons only. The machinery was overhauled after the 1935 threshing season.

2.—(*a*) A 3′ 6″-drum Bon-Accord, portable power threshing machine with sifter.

(*b*) A 28–32 h.p.-Rushton roadless tractor suitable for driving and hauling the Bon-Accord thresher.

(*c*) Spare parts for thresher and tractor.

The above threshing machinery may be sold with or without the tractors.

For further particulars apply to—

THE DIRECTOR OF AGRICULTURE,
NICOSIA.

EDITORIAL AND ADVERTISEMENT NOTICES

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

Copies of the *Cyprus Agricultural Journal* can be obtained on application to the Department of Agriculture, price *3cp.* per number, or by post *4cp.*

Annual subscription payable in advance 16*cp.* post free. Overseas subscription 18*cp.* (2/-).

SCALE OF ADVERTISEMENT CHARGES.

A special reduced rate is charged for all advertisements inserted. As the Journal is circulated throughout the Colony and copies are sent to all Colonies Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force :—

COVER—Full page, 1 year or 4 insertions	...	£2	0	0
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For Wants, Articles for Sale or Exchange, Notices of Meetings, Events, etc., for the first 16 words, 2*s.* Exceeding 16 words but not exceeding 32 words, 4*s.* For every additional 8 words 6*cp.*

Advertisements should be written on one side of the paper only, and should reach the Editor, *Cyprus Agricultural Journal,* not later than the 10th of the month of issue.

The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

Table Showing Distribution of Stud Animals at the Stud Stables and Government Stock Farm, Athalassa on 15th December, 1935.

Station	Stallion	Jack Donkey	Transferred from	Bull	Breed
Athalassa	Corby Bridge Moleskin	No 42 (Spanish) No. 38		No. 446 No. 456 No 458 No. 462	Crossbred * Kerry Cyprus Crossbred
Ayios Theodhoros ..	—	No. 50		No. 461	Cyprus
Famagusta	Mazarin	No. 53	Athalassa ..	No 448	Crossbred
Larnaca	Pitchford	No. 52		No. 455	Crossbred
Lefkoniko . ..	Marcher Lord	No. 54		No. 468	Cyprus
Limassol	Friars Flutter	No. 51		No. 430	$\frac{3}{4}$ Bred Devon
Morphou	—	No 47		—	
Nicosia	—	—		No. 450	Crossbred
Paphos	Canterbury	No. 41		No. 454 No. 459	Kerry Cyprus
Polis	Llwynog's Model	No. 49		No. 451	Kerry
Rizokarpaso	Lifeline	No. 45		No. 460	Cyprus
Vatili	Waterkoscie	No. 48		No. 443	Cyprus

* Crossbred denotes bulls which are $\frac{1}{2}$ Shorthorn, $\frac{1}{2}$ Freisian.

NOTES :—1. There are also boars at all the above Stations except Nicosia, Morphou, Limassol and Vatili and there are he-goats at every Station except Morphou.

2. Boars and he-goats may be issued on loan to *bona fide* applicants upon application to the Director of Agriculture or to the Manager of the Stock Farm, Athalassa

Department of Agriculture, Cyprus.

HEADQUARTERS—NICOSIA.

ALL general correspondence should be addressed to the Director of Agriculture.

Correspondence and applications for advice referring to the Veterinary, Entomological, Mycological or Chemical Branches, should be addressed to the Officer in charge of the Branch. When seeking advice in regard to treatment of plant pests or diseases, specimens should, whenever possible, be sent.

GOVERNMENT STOCK FARM, ATHALASSA AND

DISTRICT STUD STABLES.

Applications for services of stud animals at Athalassa or the supply of live stock, poultry, eggs, etc., should be addressed to the Manager, Stock Farm, Athalassa. Applications for services of stud animals at District Stud Stables should be made to the Stud Groom in charge. There are Stud Stables at Famagusta, Vatili, Rizokarpaso, Ayios Theodhoros, Lefkoniko, Larnaca, Limassol, Paphos and Polis.

CENTRAL EXPERIMENT FARM, MORPHOU.

Applications for permission to visit the Central Experiment Farm, Morphou, should be made to the Officer in Charge of the Farm.

SAITTA EXPERIMENTAL VINEYARD AND VITICULTURIST'S LABORATORY.

Requests for the examination of wines and advice in regard to viticulture should be addressed to the Viticulturist and Wine Expert, Limassol.

DISTRICT ORGANIZATION.

Applications for agricultural advice should be addressed to the Officer in charge of the district or area in which the applicant resides. All applications for seeds or plants should be made to the Officer in charge of the nearest Nursery Garden.

NICOSIA DISTRICT.

Agricultural Officer, Mr. S. Maratheftis, is in charge of the district, including the Nursery Garden, Nicosia, and Officers are stationed at Kythrea, Dheftera and Morphou.

Lefka Sub-District.—Agricultural Officer, Ibrahim Hakki Effendi, is in charge, including Pyrgos area.

VOL. XXXI MARCH, 1936

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A Quarterly Review of the Agriculture, Forestry and Trade of Cyprus

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1936

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Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXXI, Part 1 MARCH, 1936 Price 3cp.

EDITORIAL NOTES.

THE agricultural situation and outlook is on the whole satisfactory. The lack of rains in January and the first half of February have made the prospects for cereals in the Messaoria less favourable and in this area yields are likely to be less than in the previous year. In most other parts of the Island good rains have ensured good crops

The demand and prices for most agricultural products since the beginning of the year have maintained a fairly good level. Exceptions to this are the difficulties in marketing wines and raisins, the fall in prices for cumin and aniseed, and a tendency for the market for oranges to be inactive

Natural pastures and feed for animals are plentiful and the condition of live-stock is excellent

ORANGE DAY CELEBRATIONS

Orange day celebrations were held at Famagusta on 19th January, Morphou 28th January, and Lefka 1st March At Famagusta the arrangements for the celebrations were ably organized by Agricultural Officer, Mr A Panaretos, and the programme of events included a parade of all schoolchildren of Varosha and Famagusta to the square in front of the Commissioner's Office Various speeches were made, the Larnaca Amateurs Band provided music, there was some community singing and oranges were freely dispensed to the public. In the afternoon and evening, sports and entertainments were arranged His Excellency the Governor and the Commissioner of Nicosia were present during the celebrations at Lefka The celebrations at Morphou and Lefka were organized on similar lines to the programme arranged at Famagusta Mr. I Ierides, Mayor of Morphou, and M. Fadil, Mayor of Lefka, rendered valuable assistance in making the celebrations a success in their respective towns. These events are of considerable value in stimulating the interest in the production and local consumption of citrus fruits.

MEETING OF CITRUS GROWERS AT FAMAGUSTA.

A meeting of citrus growers and packers was arranged at Famagusta on the 27th January, 1936, where Dr. R. M. Nattrass, the Government Mycologist, gave an address on the cause and prevention of wastage in citrus fruits. The meeting was well attended and representative of the leading citrus growers, packers and shippers.

* * * * * * *

HALF-YEARLY MEETING OF AGRICULTURAL OFFICERS.

The half-yearly meeting of Agricultural Officers in charge of Districts was held at Nicosia on the 29th January. At these half-yearly meetings opportunity is taken to discuss problems arising in the course of the duties of Agricultural officers and of agricultural problems that are common to all Districts.

ARBOR DAY.

The holding of Arbor Day celebrations in village schools where a school garden is established, was revived this year and celebrations were held for Greek Schools on the 30th January, 1936, and for Moslem Schools on the 31st January, 1936 Agricultural, Forest and Education Department officers assisted the schoolmasters in the celebrations

CYPRUS SHIPPERS' ASSOCIATION.

The Cyprus Shippers' Association, which was formed for the purpose of facilitating and promoting the Colony's Trade, was duly registered at the Court on 29th February, 1936. Copies of Memorandum and Articles of Association will be on view at the Offices of the Commissioner, Famagusta, Larnaca, Limassol, Paphos and Nicosia and at the Agricultural Department, Nicosia.

Forms of application for membership will also be obtainable at these offices and those desirous of becoming members of the Association should submit applications on these forms before the end of March The first general meeting of the Association will take place in the Offices of the Department of Agriculture, Nicosia, at 11 a m. on Wednesday, 1st April.

NOTES ON PLANT DISEASES.

Heavy attacks of the spring rust *Puccinia glumarum* have already appeared on the wheat in some localities. If weather conditions continue suitable these may develop into an epidemic. The stem rust *Puccinia graminis* has not yet been seen.

Some damage was caused to the barley during December and January by the Powdery Mildew *Erysiphe graminis* which made some headway during the cold wet weather and appeared to be the cause of much of the yellowing of the crop.

The occurrence of an outbreak of *Peronospora* of the Vine is entirely dependent on weather conditions All growers should be in readiness to combat the attack should one break out. Officers of the department will keep a sharp look out for the first signs of the disease during the dangerous period. Should conditions appear suitable vine should be sprayed with Bordeau Mixture or any of the ready-made copper fungicides on the market Growers who suspect the disease should communicate at once with the nearest Agricultural Officer.

SILKWORM EGGS PRODUCTION.

The quantity of silkworm eggs available for hatching in 1936 season is 4,130 ozs., of which 2,980 ozs. were produced locally and 1,150 ozs were imported. The amount of eggs used for hatching in 1935 was 3,970 ozs

The price offered for silkworm eggs started at 10*cp*. per oz and reached 3*s*. per oz

The silkworm eggs produced in the Sericultural Station of the Agricultural Department have been sold at the usual price of 4½*cp* per dram (4*s*. per oz)

All the silkworm eggs were hibernated at Pedhoulas where accommodation was secured by the Agricultural Department and the eggs were removed for disposal on 20th February, 1936. Twenty-one persons have received silkworm egg production licences entitling them to produce silkworm eggs during the 1936 37 season.

DEMONSTRATIONAL SILKWORM REARING IN GIRLS' SCHOOLS DURING 1936.

Arrangements have been made in consultation with the Director of Education for demonstrational silkworm rearing to be carried out this season in 152 girls' schools, and one dram of silkworm eggs has been given by the Agricultural Department to each of these schools.

The rearing will be carried out by the schoolgirls of the three upper classes under the supervision of the schoolmistress.

Sericultural Officers and Agricultural Officers will visit the schools to give all necessary instructions in connection with the rearing.

In schools where there are more than one mistresses the rearing will be under the special charge of one of the mistresses.

A prize of £1 will be awarded in each district to the schoolmistress who has carried out the best demonstration while all other schoolmistresses who carry out a satisfactory demonstration will receive a prize of 10*s*.

Cereal Experiments at the Central Experimental Farm.

BY B. J. WESTON *and* CH KOUMIDES.

GENERAL.

THE purpose of the cereal experiments at Central Experimental Farm is to obtain a more accurate knowledge of the principal factors limiting the production of cereals under conditions which may be taken to be fairly representative of the chief cereal-producing areas of the Island. The purpose of these notes is to give a short account of what has already been done and what is being done to accomplish the objects in view.

It is well known that results of field experiments are unreliable unless the experiments are repeated over a period of years (usually 5 for annual crops) owing to the influence of certain uncontrollable factors such as weather Thus, inasmuch as that the cereal experiments at Central Experimental Farm have only been in progress for so short a time, little in the way of tangible results are as yet forthcoming At the same time a certain amount of useful information has already been obtained and (what is much more important at this stage) the staff at the Central Experimental Farm has gained much useful experience in conducting experiments and in methods of collecting records Since its inception the work has been hampered by the fact that the farm was not properly equipped for ordinary farm purposes still less for carrying out accurate experimental work In addition the junior staff and labourers have been tackling a job to which they were totally unused ; and further the officers responsible for the experimental work were also those upon whom the carrying out of the development programme of the farm itself principally devolved. In the circumstances much of the experimental work which should have been started has had to give place to the more urgent development work This latter difficulty will continue to some extent until all the development work is completed probably in the spring of 1937

It is hoped, however, that the results obtained in 1935 and those which will be obtained at the end of the harvest this year will provide the first data which can be used as a basis for attacking the many problems presented

OBSERVATION PLOTS —(WHEAT, BARLEY AND OATS).

Forty-five observation plots were laid down in 1934–35 ; and there are 55 this year These consist of small plots 17′ × 15′ and their purpose is to enable preliminary observations to be made on new varieties of cereals which are imported, or any specially-selected local strains which appear worthy of inclusion If a variety from the observation plots is found sufficiently promising it is "promoted" to a variety trial where it is tested against a standard local variety

The following records are compiled from varieties in observation plots from notes written up at fortnightly intervals. Area of plot in square feet ; Date of sowing , Fertilizer used (*a*) at sowing, (*b*) for top dressing ; Quantity of seed sown ; Date of germination ; Date or dates of irrigation ; Tillering ; Date first appearance of ears , Number of tillers bearing ears ; Date flowering ; Date of maturity ; Date of harvesting ; Weight of sheaves ; Yield : (*a*) grain, (*b*) straw ; Weight per kilé ; Quality of grain ; Remarks.

WHEAT.

(1) CULTIVATION EXPERIMENT.

The object of this experiment is to study the relative effects of cultivation by the local wooden plough, the modern iron plough working at the same depth as the wooden plough (5") , the modern plough ploughing deeper at a depth of approximately 9 inches, and ploughing by tractor at approximately 9 inches.

The variety used is a standard local variety " Kyperounda " and each plot is ¼ donum in extent. This experiment had of necessity to be laid out on the strip system to enable the different methods of cultivation to be carried out effectively

The plan of the experiment is as follows —

d	b	c	a	c	d	a	b	d	a	c	b	c	a	d	b
(1)	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(3)	(4)	(4)	(4)	(4)

(*a*) — native wooden plough (approximately 5 inches),
(*b*) — modern iron plough (approximately 5 inches)
(*c*) do do (approximately 9 inches)
(*d*) — tractor plough (approximately 9 inches).

The 1935 results from the experiment show a significant increase in yield in favour of tractor ploughing, but no useful results can be expected from this experiment for several years

(2) FERTILIZER EXPERIMENT (TYPES)

This experiment is designed to test the effect of nitrogen fertilizer, phosphatic fertilizer and FYM when applied alone, and is laid out as a Latin Square according to the plan given below .—

(*a*) 1	(*b*) 1	(*c*) 1	(*d*) 1
(*d*) 2	(*c*) 2	(*a*) 2	(*b*) 2
(*b*) 3	(*a*) 3	(*d*) 3	(*c*) 3
(*c*) 4	(*d*) 4	(*b*) 4	(*a*) 4

Treatments :

8 okes per donum sulphate of ammonia before sowing.
,, ,, nitrate of soda as a top dressing.

b FYM 3 tons per donum;

c. Superphosphate 40 okes per donum before sowing.

d. Control. (no manure or fertilizer).

The 1935 results indicate that the yields obtained when nitrogenous fertilizer and FYM are applied, are significantly higher than the control and the mean of all plots.

(3) FERTILIZER EXPERIMENT (AMOUNTS).

This experiment is designed to test the effect on yield of nitrogenous or phosphatic fertilizers applied together at different rates per donum, and is laid out in a Latin Square according to the plan given below :—

a (1)	b (1)	c (1)	d (1)
c (2)	d (2)	a (2)	b (2)
b (3)	a (3)	d (3)	c (3)
d (4)	c (4)	b (4)	a (4)

Treatments :

(*a*) 4 okes Sulphate of ammonium per donum before sowing
20 ,, Superphosphate per donum before sowing.
4 ,, Nitrate of soda as top dressing.

(*d*) 8 okes Sulphate of ammonium per donum before sowing;
40 ,, Superphosphate per donum before sowing,
8 ,, Nitrate of soda as top dressing:

(*b*) 16 okes Sulphate of ammonium per donum before sowing,
80 ,, Superphosphate per donum before sowing.
16 ,, Nitrate of soda as top dressing.

(*c*) Control—No manuring.

The 1935 results indicate that a significant increase in yield is obtained with the double dose of complete fertilizer (*b*). If financially treated, however, the increased yield of 1.5 kilés per donum does not pay for the extra quantity of fertilizers applied in the double dose.

Both these fertilizer experiments are preliminary in character and will be followed up by more complete experiments which, it is hoped, it will be possible to lay down in the autumn of this year.

(4) ROTATION EXPERIMENT.

This experiment is designed to ascertain the best rotation system which can be adapted to ordinary practice in the Messaoria.

The rotations included are :—

(1) Wheat followed by bare fallow ,
(2) ,, ,, leguminous green manuring crop (Vicos)
(3) ,, ,, crop (Vicos) harvested and stubble ploughed ;
(4) ,, unmanured year after year.

The current season being the first year of the experiment proper, all plots are sown to wheat

(5) SEED RATE EXPERIMENT

This experiment is designed to test the response of yield to different seed rates and is arranged in the form of a Latin Square as in plan given below :—

a (1)	c (1)	d (1)	b (1)
d (2)	b (2)	a (2)	c (2)
c (3)	a (3)	b (3)	d (4)
b (4)	d (4)	c (4)	a (4)

a · 9 okes per donum
b · 11 ,, ,,
c . 13 ,, ,,
d · 15 ,, ,,

No significant results have as yet been obtained from the experiment in 1935 the mean square due to error being higher than the mean square due to treatments

The foregoing experiments are being conducted as a series on the same land over a period of 5 years The variety used is the local wheat variety " Kyperounda ", the size of plots in all experiments being ¼ donum with a path of 1 yard between plots.

VARIETY TRIALS.

(1) *Wheat.*—This is a trial of 8 varieties, two of which are local ones In view of the large number of plots which would have been necessary if this was laid down as a Latin Square, the experiment was laid out on the " equalized randomized block " system, each variety being replicated 4 times, as in plan below, the plots being $\frac{1}{40}$ of an acre in extent (11 × 11 yards) with a path of 1 yard wide between plots.

Block 1	Block 2	Block 3	Block 4	
A	D	C	B	Block I
E	H	C	F	
F	A	H	C	Block II
B	E	D	B	
H	C	F	A	
D	C	B	E	Block III
C	B	E	D	
G	F	A	H	Block IV

Varieties

A = B.X.I.P.I.
B = Gluyas Early
C = Marocaine 024
D = Hamira 436
E = Hugenot
F = Rietti
G = Psathas
H = Kyperounda

(2) *Barley*.—The barley variety trial contains 8 varieties (6 imported and 2 local) and the same layout plan is followed as is described above for wheat. The plot size is also the same.

In this trial A = Egyptian
B = Black Barley (Tripoli)
C = Mariotti
D = Coast
E = South African 6 row
F = Cyprus Black
G = Paphitiko
H = 4 A.

(3) *Oats*.—This is a trial of 4 varieties put down in a simple Latin Square, the varieties included being Texas, Cawra, Cyprus Black and "0238". Plot size being the same as in the Wheat and Barley Variety trials.

These 3 experiments were laid down in December, 1935, on land which had previously been bare fallowed. All plots in all 3 experiments received at the time of sowing a dressing of 3 okes per plot 4–12–3 fertilizer. The Imported Varieties under trial in each case being those which from their performances in Observation Plots have been thought worthy of inclusion in a yield trial against standard local varieties.

Injurious Insects of Cyprus.

BY H. M. MORRIS, M.Sc., F.R.E.S., *Government Entomologist, Cyprus.*

INTRODUCTION

THE records on which this list of injurious insects and mites of Cyprus is based have mostly been obtained during the past thirteen years, there being very few records dating from before that period. These records were obtained partly by Mr. D. S. Wilkinson, who was Government Entomologist in Cyprus from 1923 to 1926 and by myself and my assistants since my arrival in the Colony early in 1927. While there are doubtless many more species causing slight or rare damage to crops, the species listed below are probably those causing most frequent damage. Mention is also made of those species causing injury or annoyance to man and to domesticated animals so far as information concerning those species is available. I am indebted to the Imperial Institute of Entomology for the identification of most of the insects mentioned, and to Mr. E. E. Green for the identification of Coccidae. The valuable assistance given by these authorities is gratefully acknowledged.

A few species are included in this list which have not actually been recorded as causing damage to cultivated plants in Cyprus, but which have been so recorded elsewhere and whose occurrence in Cyprus it therefore appears desirable to place on record.

Most of the records available dating from prior to 1923 are those contained in the *Cyprus Journal*, later the *Cyprus Agricultural Journal*, and other publications of the Agricultural Department. These references are chiefly to the commoner pests but two or three references are to less usual pests and these have been included in the present list.

The chief published list of the insects of Cyprus appears to be that of Unger and Kotschy (1). A list of butterflies has been published by Turner (2), and there is a short list of moths in the *Handbook of Cyprus* (1920 edition), the list of butterflies in that edition being amended in the 1930 edition, the latter being based on Turner's list. Further study of the moths is believed to have been made but has not been published, so far as is known.

There are a number of scattered references to the occurrence of insects of economic importance in Cyprus (3) and (4), some of which references have been seen but are not included in the list of references given herewith. The published accounts referred to here and included in the list of references are all those known which deal at all fully with the occurrence in Cyprus of insects of economic importance, but papers consisting only of a description of a new species are not included even if the new species described is of economic importance. Publications of the Cyprus Agricultural Department are not included in this list of

(1) Unger and Kotschy, *Die Insel Cypern*, Vienna 1865.

(2) Turner, H. J., "The Butterflies of Cyprus." *Trans. Ent. Soc.* 1920, pp. 170–207.

(3) Freeborn, S. B., "Citrus Scale Distribution in the Mediterranean Basin," *Journ. Econ. Ent.*, XXIV, No. 5, 1931, pp. 1025–1031.

(4) Hall, W. J., "The Insect Pests of Citrus Trees in Egypt," Ministory of Agriculture, Egypt, Tech. and Sci. Service, *Bulletin* No. 45.

references. These publications consist of leaflets, bulletins, annual reports and the *Cyprus Agricultural Journal*, formerly the *Cyprus Journal*, and contain numerous references to insects pests, which have been embodied in the present account.

The world distribution of the various injurious insects mentioned in this list has not been gone into detail but in the case of a few species this distribution may be briefly referred to.

Four species of insects which have up to the present been recorded only in Cyprus, cause damage to crops, etc, here, although their host plant or animal has a much wider distribution: *Anthonomus cyprius*, *Thaumetopœa wilkinsoni*, *Asphondylia capsici* and *Hypoderma æratum*. It is possible that more detailed study in neighbouring countries may show these species to be of wider distribution.

Some other insects occur as pests in Cyprus and also in neighbouring countries, but do not occur elsewhere although their host plant is more widely distributed. An example of this is *Syringopais* (*Nochelodes*) *temperatella*, which occurs as a pest in Cyprus and also in Syria and Palestine, and possibly in other adjacent countries, but is not more widely distributed although its cereal host plants are widely distributed.

In the case of a number of pests which are not limited to one food plant or to a group of closely related species, their natural range is far wider. Example of such pests are *Heliothis obsoleta* and *Prodenia litura* which are to be found almost throughout the world, their distribution having very probably been unwittingly assisted by man. Other pests, although occurring over a wide area which includes Cyprus are not, however, distributed throughout the world, or throughout the range of their particular food plant.

Many injurious insects owe their present wide distribution to having been carried by man in fruit or other plant products from one country to another, until at the present time, as for example in the case of *Cydia pomonella*, they occur practically wherever their host plant is grown. Not all such pests have yet attained to their fullest possible distribution and for example, *Ceratitis capitata* has not been able to establish itself permanently in North America where there are large areas suitable for its development and where it could without doubt become a very serious pest.

Several of the more important pests occurring in Cyprus have doubtless obtained a footing here through their having been accidentally introduced by man. Examples of such pests are *Platyedra gossypiella* which was most probably introduced a number of years ago in cotton seed imported from Egypt without sufficient precautions being observed, and *Phthorimœa operculella* which seems to have been introduced either in a consignment of potato seed from France about 1916, or more probably about that time in imported sacks which had previously contained infected potatoes.

The distribution of pests from country to country, or between different areas in the same country, is now prevented as far as possible by the enforcement of quarantine regulations controlling the importation and distribution of plants or plant products which might possibly carry with them pests not already established in the importing country or area, or

new infestations of pests already under control. These quarantine regulations are constantly becoming more severe, yet in spite of them pests are still able to appear in countries where they have not hitherto been known, as for example the occurrence of *Ceratitis capitata* in Florida a few years ago.

From the point of view of Cyprus there is a group of insects of very great importance: those which are serious pests elsewhere and even in neighbouring countries but which have not so far become established in Cyprus although conditions in Cyprus appear to be very suitable for them. This group of insects includes *Chrysomphalus aonidum* which is a serious pest of citrus trees in Syria, Palestine, Egypt and elsewhere, and also attacks a large variety of other plants. *Phylloxera vastatrix* is another very serious pest in neighbouring countries which does not occur in Cyprus. Precautions have been taken for some years past to prevent, if possible, the introduction into Cyprus of these and other injurious insects, although it is surprising that those occurring in neighbouring countries were not introduced into Cyprus long ago before such precautions had been thought of.

It is also of interest to note that several species of insects which are injurious to crops in other countries and which occur in Cyprus, do not cause appreciable injury here, or cause much less serious damage. In this connection may be mentioned *Lecanium* (*Saissetia*) *oleæ*, which is only an occasional pest of the olive and citrus trees in Cyprus although it is a serious pest of citrus trees elsewhere, and *Aspidiotus hederæ* which is a common and sometimes serious pest of carob, wattle and a variety of other plants in Cyprus but does not appear to attack citrus trees here as it is reported to do in Italy and France.

A fuller account of the most important pests in Cyprus with recommendations for their control and instructions for the preparation of insecticides, has already been published [" Insect Pests and Fungus Diseases of Cyprus and their Control," *Bulletin* 3 (Entomological Series), Agricultural Department, Cyprus].

[*to be continued in the June issue.*]

Diseases of Poultry

WITH SPECIAL REFERENCE TO THOSE OCCURRING IN CYPRUS.

BY R. MOYLAN GAMBLES, *Veterinary Officer*.

POULTRY keeping in Cyprus is essentially a peasant industry. The following account of the diseases which occur among the poultry in the Island, or are liable to occur, is therefore primarily intended to be a simple guide for the progressive villager, and to enable him to check disease when it occurs in his flocks, and avoid the conditions that favour its spread. It does not profess to be a profound or complete exposition of the subject, or to be the outcome of any original work.

Poultry are liable to a great many diseases, most of which occur in Cyprus. Many of them closely resemble each other, and can only be distinguished by examination in the laboratory. The following symptoms should be looked for. In most diseases the birds become dull, and often do not feed. There is often a paleness of the combs and wattles, especially in chronic and wasting diseases. In more acute diseases, the combs and wattles may be a dark purplish red. Diarrhœa is often present, and may be green or yellow, and often foul-smelling. Birds often look dejected and droop. They sometimes become lame or paralyzed. Death may be sudden, or after many weeks' sickness. Sometimes the birds recover. These symptoms are not diagnostic, and different birds suffering from the same disease may show quite different symptoms.

In most diseases there is no curative treatment which is of any use. The important thing is to prevent the spread of the disease. It will be seen from the descriptions that follow, that it is not easy for the owner to diagnose the disease himself, so carcases should be sent to the laboratory as soon as possible, and when the cause of the disease is discovered, its control can be commenced.

FOWL POX. Also called " Roup " and " Fowl Diphtheria."—This is the commonest disease of poultry in Cyprus, and one of those that are easily recognized. It exists in several forms, very different in appearance, of which more than one can occur together. The commonest form is that in which the mouth and throat are covered with soft membranous scabs, which, when pulled off, leave a raw and bleeding surface. These scabs often occur in the larynx and trachea, and may affect the lungs and the heart. In this form, mortality is high ; and when the internal organs are affected, death may occur suddenly.

In another form of the disease, the skin is affected with scabs, usually on the comb and wattles, but sometimes on the legs and breast. When all the scabs are outside, the birds usually recover in two or three weeks.

There is a third form of the disease which affects the eyes and nose. At first there is a watery discharge, which soon becomes thick and sticky. Discharge often collects in the eyes, where it turns to a hard cheesy mass, completely hiding the eyeball. Cheesy masses may also collect in the cavities of the skull, causing a large swelling on the side of the face between the eyes and the nostril.

In all three forms, it is possible for the disease to strike inwards, and poison the blood. The bird then dies very quickly.

It is not wise to try to treat the birds, as the disease spreads rapidly. The safest way to deal with an outbreak is to slaughter all the ill birds. If too many are affected for slaughter to be feasible, they should be kept far away from the healthy birds. The healthy birds can be vaccinated, and after two or three weeks they will be safe from infection for several months. Vaccination will not cure sick birds. If it is desired to treat valuable birds, this is done by removing the scabs from the throat and mouth with forceps, and painting the raw surface with a mixture of tincture of iodine and water in equal parts. When the eyes or nose are affected, these may washed out with Boracic powder dissolved in hot water, or the whole head may be dipped in a solution of Potassium permanganate.

When there is swelling of the side of the face, the discharge can be removed surgically by opening up the cavities of the skull. Skin lesions can be treated with oil containing 5% carbolic. The scabs are carefully removed, and the oil applied twice daily to the raw surface.

SPIROCHAETOSIS.—This disease is caused by a minute parasite invading the blood. It is spread from bird to bird by the bite of fowl-ticks, and is common in Cyprus. There is no symptom peculiar to the disease. Birds just look dull and drooping, and die in large numbers. In acute cases, the comb and wattles are congested and dark red. In more chronic cases there may be paralysis. It can only be recognized by microscopic examination of the blood, which should be taken while alive, as the parasites disappear shortly after death.

Affected birds can often be cured by injecting a drug called "Atoxyl," but this is obviously no use unless the ticks which carry the disease, are attacked at the same time. The ticks live in cracks in the hen-house, or under the bark of neighbouring trees. They come out by night, and attack the birds while roosting. If the hen-house is a cheap wooden one, it is best to burn it, and build a new one. If this is not possible, the whole of the hen-house should be painted or tarred, special attention being paid to all cracks and crevices, which should be filled in with gypsum. Whitewashing is bad, as it tends to flake off, and the flakes provide a hiding place for ticks. In some cases, it is possible to go over them with a blow-lamp. An additional measure is to stand the feet of the roosts in tins full of water. As long as there is water in every tin, and no part of the roost touches the side of the hen house, the ticks will not be able to reach the birds. The roosts should be far enough from the walls for no part of the bird to touch the wall or the ticks will walk up the feathers. Roosts which are fixed to the side of the hen-house are bad.

TUBERCULOSIS.—This is a chronic disease, and the birds do not usually appear to be very ill, but are thin and pale. Sometimes they go lame. Where only young birds are kept, there are not many deaths, but in flocks of older birds, the mortality may be very heavy. During life, the disease can be detected by the Tuberculin Test. In birds that have died from the disease, tuberculous nodules will be found in the liver

or along the intestine. These nodules are round or oval and of any size up to half-an-inch across. At first they are soft, but as they grow larger and older, the contents become hard and cheesy. The lungs are hardly ever affected.

There is no treatment for the disease, and all affected birds should be killed and burnt, to prevent spread. The houses should be thoroughly cleaned and disinfected.

FOWL CHOLERA.—This is very serious disease in that it is rapidly spread, and the mortality is high. The course of the disease is short, and the birds die rapidly. The bird shows no symptoms peculiar to the disease, and it is not possible to diagnose it, except by laboratory examination of a freshly-dead bird, when the germ causing the disease can be found in the blood in large numbers. Ill birds just appear drowsy, and often show a discharge from the nostrils, or a greenish or yellowish diarrhœa, which sometimes contains blood. The combs and wattles are usually dark red, the birds often show excessive thirst. Sometimes birds die suddenly without showing any symptoms.

There is no treatment, and when the disease is definitely diagnosed, all ill birds should be slaughtered. A vaccine can be prepared, and if given to the healthy birds, it will lessen their chance of becoming infected.

FOWL TYPHOID.—This is another serious disease, and cannot be distinguished from Fowl Cholera except by laboratory examination of a freshly-dead bird. The combs and wattles are frequently paler than normal, and the bird becomes very weak and thin, sitting about drowsily and with the head drooping. There is usually a sulphur-yellow diarrhœa. Sometimes birds die suddenly, as in Fowl Cholera, but the course of the disease is usually slower, and the spread less rapid. Very careful disinfection is necessary, because soil contaminated with droopings can harbour the germ which causes the disease for a very long time.

There is no treatment, and recovered birds are carriers of the disease, so as soon as definitely diagnosed, all affected birds should be slaughtered and the rest of the flock vaccinated to prevent them becoming infected.

COCCIDIOSIS.—This disease is caused by a minute parasite, occurring in various parts of the intestine. The disease mainly affects young chicks (two weeks to three months). There is grey diarrhœa, which is often blood tinged. The disease can be diagnosed by microscopical examination of the droopings of the chicks to see if coccidia are present. When older birds are affected, the disease is usually chronic and often causes paralysis.

Treatment is not very satisfactory, but birds sometimes recover if fed on sour milk (*yaourt*), or milk containing a very small amount of iodine. The most important thing is to prevent the birds re-infecting themselves from their droppings, by scrupulous cleanliness. Chicks should be kept in cages with wire-mesh floors, so that the droppings will fall through onto a tray below, where they must be swept up daily, and burnt.

B.W.D. (*Bacillary White Diarrhœa*).—This is mainly a disease of young chicks, and when these are artificially incubated, it causes heavy losses. When chicks are hatched by the hen, the disease spread more slowly. Fortunately it is not known to occur in Cyprus. The chicks show a yellowish-white diarrhœa during the first few days of life, and die in large numbers. Those that recover harbour the disease in the ovaries, and lay eggs which hatch into affected chicks. No treatment is possible.

FOWL-PLAGUE AND NEWCASTLE DISEASE—are two other serious diseases of poultry, which fortunately do not occur in Cyprus. But *Fowl-Plague* is very common in Egypt, so care must be taken that it is not accidentally introduced. The two diseases are almost indistinguishable, except by long and complicated tests in the laboratory. There are no characteristic symptoms. When once a bird becomes ill, it nearly always dies.

LARYNGO-TRACHEITIS—is another infectious disease of poultry, involving, as its name implies, an inflammation of the larynx and trachea, which are found, after death, covered with a sticky discharge, and full of clots of blood on and under the mucous membrane. Affected birds cough frequently, and often show a characteristic gasping respiration. It has never definitely been recorded in Cyprus, but it is possible that it may occur. Affected birds should be isolated, or preferably slaughtered, and the premises carefully disinfected.

BLACKHEAD—is mainly a disease of turkeys, but it sometimes affects chickens. It has never been found in Cyprus It is characterized by an inflammation of the intestines, and yellow spots on the liver. It must not be confused with tuberculosis, in which the nodules are more spherical, and have a hard cheesy centre. Sometimes the heads of young turkeys become a purplish black, but this is not a frequent symptom, and may occur in many other acute infections.

PARALYSIS.—Paralysis and other forms of lameness are commonly met with among poultry, and arise from many different causes, such as worms, tuberculosis, coccidiosis, chronic spirochætosis, and bad feeding. If the paralysis is only slight, it may often be cured by dosing the bird for worms, or giving green food. But where due to tuberculosis, the bird will get progressively worse, and had better be destroyed.

There is also a specific form of paralysis, which is caused by a swelling of the nerves of the legs or wings. Some authorities think that this disease may be infectious, but most do not believe this. Only two birds have been found in this condition in Cyprus, all other cases of lameness and paralysis being due to other causes.

LEUCAEMIA—is a disease of the blood-forming organs, and the blood is of a pale colour, owing to the presence of too many white corpuscles. The birds become pale and weak, and may die suddenly. It is uncertain whether or not the disease is infectious. It has never been recognized in Cyprus. There is no treatment known.

GOUT—is due to some fault in feeding, usually by too rich a diet, and is not common in Cyprus. There are two forms, one affecting the joints and making the birds lame, and the other affecting the internal organs, and often causing sudden death. Crystals of uric acid cover the liver or heart, giving them a white glistening appearance.

NUTRITIONAL ROUP.—This consists of a running at the nose and eyes, which results from wrong feeding, usually from not enough green food. The discharges may collect in the eyes and skull cavities in the same way as they do in Fowl-pox, and can be treated in the same way. Nutritional roup must be carefully distinguished from Fowl-pox. There will be no scabs on the combs and wattles, or inside the mouth. The back of the throat and gullet. however, often show small white pimples. The disease is not infectious, but it often comes on slowly and spreads through the whole flock. This is not because it is passed from one bird to another, but because the whole flock has been suffering from a deficiency of green food for some time, and are beginning to suffer from the effects of it. If the diet is corrected, and the birds affected are well cared for, most of them will recover.

WORMS.—These can either be round-worms, or tapeworms. There are two kinds of intestinal roundworms commonly occurring in Cyprus. The smaller one is about half-an-inch long, and does no harm unless it is present in very large numbers. The larger one varies in length from one to five inches, and is more harmful. These worms are transmitted direct (*i.e.* the eggs are passed out with the droppings, and birds re-infected by swallowing them).

The tapeworms are made up of a string of flat segments. There are many different kinds, and a number of them are to be found in Cyprus. When these occur in large numbers, they can make the birds very weak, and may cause death, either directly, or by bringing the bird into a condition where it is easily affected with other diseases. A few worms in a bird will do it no harm, and are almost unavoidable, but care should be taken that the numbers do not increase, or heavy losses will occur. The life-history of the worm is indirect. The egg is passed with droppings, and will only develop if it is eaten by a slug, earthworm, beetle, or house-fly, etc. It develops inside these, and if the intermediate host is swallowed by the hen, then the worms develop into their adult form.

There are three ways of controlling tapeworms in poultry :—

(i) by dosing the birds from time to time, so as to clear out the worms which are already present, and burning the droppings, with the worms passed out in them. One teaspoonful of freshly-powdered areca nut in a mash for every ten birds is often a satisfactory dose.

(ii) by destroying the droppings regularly, before flies, beetles, etc., have time to eat the eggs contained in them.

(iii) by reducing the numbers of flies and slugs. Flies can be controlled to a considerable extent by keeping all the premises clean. Slugs are less easily controlled, but in Cyprus these are of less importance than the flies.

Tapeworm disease can often be recognized by seeing pieces of the worm in the birds' droppings, although it is not always easy to find them. The droppings are often bloodstained. The best way of recognizing the disease is to open up a dead bird, when the worms will be found in numbers in the intestine.

There is another kind of worm that causes serious harm in poultry in many parts of the world, but fortunately it does not occur in Cyprus. This does not live in the intestine, but in the trachea, and causes a disease called "Gapes." The trachea becomes full of worms and the bird has difficulty in breathing, and keeps its mouth open and gasps in a characteristic fashion. Birds become very weak, and large numbers die from choking.

LICE AND FLEAS.—There are many different kinds of lice and two kinds of fleas that affect poultry. The lice live on the birds all their life, laying eggs, among the feathers. These eggs hatch into young lice, similar to the adults in everything except size. The fleas, on the other hand, lay eggs which fall off the bird, and hatch into small white maggots which live among the dust of the hen-house floor. When these have undergone various changes, and hatched into the adult flea, they jump on to the bird, and commence their parasitic existence.

There is no record of either flea having been found in Cyprus, but the lice are very common. A few of them will do no harm, but where they are numberous the bird is made weak with continued scratching, and is more liable to other diseases.

Lice are quite easily removed, either by rubbing sodium fluoride into the skin or by painting the roosts with nicotine sulphate. When the birds' settle down on the perches, the warmth of their bodies causes the nicotine to give off fumes which kill the lice. If a thick sheet of paper is laid under the perch, next morning an enormous number of dead lice will be found among the droppings on the paper.

TICKS.—These have been mentioned before, under Spirochætosis, but it must not be thought that this is their only danger. Even where this disease is not present, the ticks still do harm, and make the birds weak by the amount of blood which they suck, and by interfering with the birds,rest at night. The ticks can be attacked as mentioned before. The young ticks which are frequently found clinging to the birds by day, may be destroyed by applying a mixture of one part of petroleum with five or six parts of olive-oil.

SCALY LEG.—This condition is caused by another small parasite, rather similar to the ticks, but so small that it can only be seen with the microscope. They get under the scales, and multiply there, forming thick crusts, in which they breed. The legs become thick swollen and crusty, and the birds often go lame. Treatment consists of soaking the legs in washing soda dissolved in hot water. This softens the scales, and the crusts can be removed. The legs should then be dried, and a sulphur ointment rubbed in. The ointment is no use without the soda treatment first, as it cannot penetrate the crusts, and so does not reach the mites. Waste engine oil may be used instead of sulphur ointment.

MISCELLANEOUS.—Poultry are susceptible to a large number of conditions, which although not due to contagious disease, are none the less responsible for large numbers of deaths. The intestines are liable to become inflamed (enteritis) when the bird has been exposed to undue cold, damp surroundings, or irritant food. When the inflammation is severe, the birds often die. When mild, it is merely shown by a simple diarrhœa, which can be cured by putting a teaspoonful of powdered catechu in each gallon of drinking water. Permanganate of potash in the drinking water helps to avoid this condition. It also serves to indicate when the water is stale and unwholesome. Enough permanganate should be added to turn the water red. When it starts to become brown, it is time to change the water. On the other hand, the bird may become constipated, and require some epsom salts to make the bowels act freely again. It is advisable to give all poultry a dose of salts with the feed once a month, one tablespoonful dissolved in water, for every twelve birds. When a bird shows constipation, it should be dosed with a teaspoonful of salts dissolved in water. When the intestines are blocked up completely (impaction) sometimes salts will not be able to clear it, and the bird will die. Sometimes the crop is impacted. When this is caused by fairly soft material, the bird can be held upside down, and the contents gently squeezed out through the mouth. When the crop is impacted by a hard mass of tangled grass, etc., some olive-oil should be given and the crop then massaged frequently. If this fails it will be necessary for the crop to be cut open, washed out, and carefully sown up again.

Sometimes, after exposure to cold, especially in chicks, the birds get pneumonia (inflammation of the lungs). They then show a high temperature, with rapid breathing, and usually die in a short time There is no treatment feasible. The reproductive organs, especially of heavily-laying hens, are liable to inflammation and obstruction. Where the egg cannot be passed, it is sometimes possible to remove it with a well-oiled finger, if the egg is near the opening of the vent. But when it is higher up, it is not possible to remove it, although if the hen is held over a bowl of steaming hot water, she is sometimes able to pass the egg without other assistance. Inflammation of the lining membrane of the body cavity (peritonitis) often follows diseases of the egg-forming organs, and then the bird almost invariably dies.

Abscesses not infrequently occur in poultry. The commonest site is on the foot. They are not uncommon on the breast, usually where birds are not provided with perches and have to sleep on the ground. Abscesses should be cut open with a clean sharp knife, and the cavity washed out with tincture of iodine. The pus is usually hard and cheesy, unlike the fluid pus found in mammals.

GENERAL REMARKS.—It will be seen from what has been said that the most vital precautions to be taken to keep poultry free from disease consist in scrupulous cleanliness and wholesome feeding, with plenty of green food whenever possible. Until the day dawns when every one who owns poultry pays proper attention to these matters, there will always be disease. Therefore, it is necessary for the careful poultry keeper to keep his birds separated from those of his less intelligent neighbours. As long as poultry are left to run about the streets with

all the other birds of the village, they will be liable to every disease that appears, however clean their own homes are. Therefore, all poultry should be kept in enclosed premises. All fresh birds that are bought to be added to the flock should be kept elsewhere for one or two months, in case they bring any disease in with them and infect the rest of the flock. If any of the birds thus isolated become ill, they should be removed at once. If the rest remain healthy, they can be added to the flock when the isolation period is over. Hen-houses should be swept up regularly, and the droppings disposed of. The inside of the houses should be thoroughly washed every six months with disinfectant, and all crevices filled up with gypsum. Roosting perches should not be attached to the walls, but should be kept quite away from them, and supported on legs standing in tins of water, which should be replenished daily. Thus the birds will be able to escape the attacks of ticks. Whenever the birds show evidence of lice, nicotine sulphate should be painted on the perch. The lice that drop off underneath the perch should be swept up and burnt, in case any of them are only stupefied instead of being killed

When birds die, the carcases should either be buried or burnt. Failure to do this will spread the disease to neighbouring premises and from them it will in turn be passed back to one's own. Vaccination against poultry disease only gives protection for a short time so it is not practicable to vaccinate poultry until a disease appears on one's premises or on those of neighbours Vaccination never cures sick birds but prevents those that are still healthy from becoming infected, and therefore it must be done as early as possible. The Veterinary Service can only undertake to vaccinate poultry when the owners themselves do their share by keeping their poultry under healthy conditions It is merely a waste of time and money to vaccinate birds that are left to mix again with diseased birds and feed on rubbish heaps infected with carcases, as these will become infected as soon as the effect of the vaccine has passed.

If poultry keepers observe the rules of cleanliness and correct feeding, and keep their birds away from all possible sources of disease, although a certain number of deaths cannot be avoided, they will be able to prevent heavy losses among their poultry.

Cotton Experiments.

By A. M. Frangopoulos, B.Sc. (Agric.).

The Cotton Experiments started in 1930 and were repeated this year in the Central Experimental Farm, Morphou. It is hoped by these experiments to find suitable varieties of good quality cotton and to improve the cultural operations as a preliminary step towards the general improvement of the Cyprus Cotton Industry.

Although local varieties are believed to be good yielders, they are lacking in quality of lint and are not pure strains. Trials with better varieties of pure strains are being carried out by the Agricultural Department and it is hoped in a short time to be able to recommend those foreign varieties which during these experiments have exhibited better qualities than the local varieties.

These experiments comprise :—

(1) Date Experiments,
(2) Fertilizers Experiments,
(3) Spacing of plants experiments,
(4) Irrigation Trials, and
(5) Variety Trials.

The results of the 1935 experiments were as follows :—

(1) Date Experiments.

This experiment was arranged according to Fisher's Latin Square arrangement (five treatments and five replications), and the variety used was "Titsiros." The dates of sowing, 15th March, 29th March, 12th April, 26th April and 10th May, were randomized as follows :—

A.	D.	B.	C.	E.
C.	B.	E.	A.	D.
E.	A.	D.	B.	C.
D.	C.	A.	E.	B.
B.	E.	C.	D.	A.

A. Sown on 15th March.
B. Sown on 29th March.
C. Sown on 12th April.
D. Sown on 26th April.
E. Sown on 10th May.

The results obtained were as follows :—

Treatments.	Sown at.						
	15th March	29th March	12th April	26th April	10th May	Mean	Standard Error
Seed cotton per donum okes..	130.80	135.68	128.90	90.64	60.00	109.20	9.38
Seed cotton per cent. of mean okes	119.70	124.20	118.00	83.30	54.00	100.00	8.50

Yields obtained from cotton sown on 15th and 29th March and 12th April are significantly higher than the yields from cotton sown on 26th April and 10th May.

Similar results were obtained in previous years and it can now be safely recommended that irrigated cotton should be sown not later than the end of April.

The decrease in the yield obtained from late sowings is chiefly due to Pink and Spiny Boll worm attack. Experiments in other countries have also indicated that the higher yields are obtained from early sowings through their partly escaping Boll worm attack. Anything which tends to produce an earlier crop is of importance in reducing the loss caused by Boll worms.

Results in okes per donum obtained from Date experiments from 1930 to 1935 :—

Year	March	1st half April	2nd half April	1st half May	2nd half May	June
1930	209.00	167.50	176.00	161.00	132.00	110.00
1931	—	247.00	224.00	148.00	139.00	92.50
1932	189.18	184.00	170.00	155.00	139.00	75.00
1933		No Records.				
1934	93.74	83.33	80.33	50.83	—	—
1935	133.24	128.90	90.64	60.00	—	—
Total ..	625.16	810.75	740.97	574.83	410.00	277.50
Mean ..	156.29	162.14	148.19	114.96	136.16	92.50

FIG. 1. *Cotton Sowing.*—The land was ploughed twice, clods crushed, and then ridged. The stick is used for making the holes in which the seed is placed and for the measurement of the distance between holes.

FIG 2 *Irrigation of Cotton Ridges after Sowing* Special care should be taken for the water to reach the seed to insure a good stand

FIG 3 *Picking of Cotton* —The boll is not cut from the plant and special care is taken not to mix dry leaves with the cotton

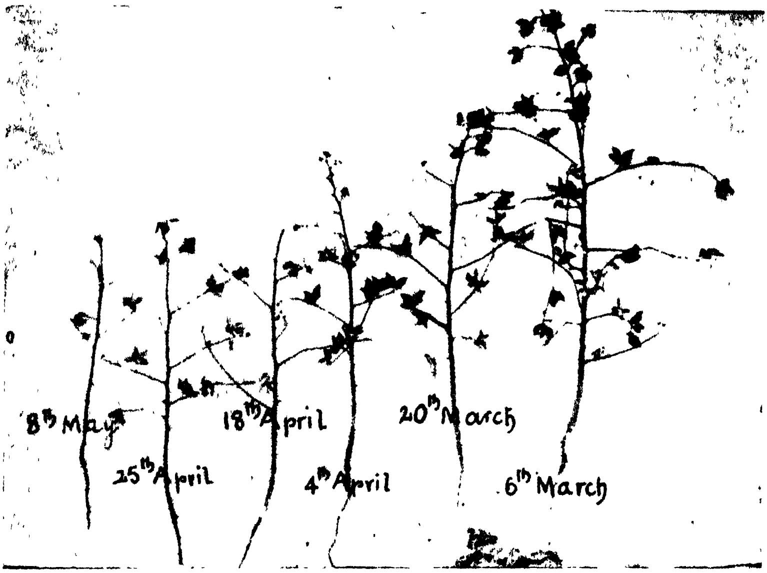


FIG. 4 — Cotton plants which were specially defoliated to show the difference in number of bolls between plants sown at different dates.

(2) FERTILIZERS EXPERIMENTS.

Four treatments (three types of fertilizers and one control) and four replications were also randomized according to the Latin Square arrangement. The types used were :—

4 units nitrogen, 10 potash, known in the market as 4 . 0 : 10.
4 units nitrogen 10 phosphoric acid, 10 potash, known as 4 · 10 · 10.
4 units nitrogen, 10 phosphoric acid known as 4 · 10 · 0.

The following results were obtained :—

Treatments	4 0 10	4 10 10	Control	4 10 . 0	Mean	Standard Error
Seed Cotton, per donum, okes..	124.00	116.00	117 00	115.50	118.12	2.61
Seed Cotton, per cent., okes ..	105.00	98.20	99.00	97 80	100.00	2.21

No significant differences were obtained between treatments or between any treatment and control due, perhaps, to the quantity of fertilizer per donum being small.

(3) SPACING EXPERIMENTS.

Four different spacings between plants were compared (13 inches, 18 inches, 10 inches and 16 inches) but no appreciable differences in yield were obtained.

(4) IRRIGATION TRIALS.

Two sets of four plots, each having an area of half a donum, were planted in equal parts with "Titsiros" and "Mesowhite." All plots were sown in April and received three irrigations up to the 26th June, 1935. The quantity of water for these irrigations was not measured owing to the non-completion of the special irrigation tanks. After that date, irrigations were given as follows :—

First Set of Plots.

a "Titsiros" a "Mesowhite"	Irrigated every 15 days up to the middle of September, at the rate of 15,000 gallons per donum.
b "Titsiros" b "Mesowhite"	Irrigated every 15 days up to the middle of September, at the rate of 20,000 gallons per donum.
c "Titsiros" c "Mesowhite"	Irrigated every 15 days up to the middle of September, at the rate of 30,000 gallons per donum.
d "Titsiros" d "Mesowhite"	Irrigated every 15 days up to the middle of September, at the rate of 40,000 gallons per donum.

The results obtained were as follows :—

a	"Titsiros"	 122	okes per donum.
b	do.	 116	do.
c	do.	 114	do.
d	do.	 96	do.
a	"Mesowhite"	 100	do.
b	do.	 119	do.
c	do.	 104	do.
d	do.	 149	do.

Second Set of Plots.

A. "Titsiros" A. "Mesowhite"	30,000 gallons per donum every 12 days.
B. "Titsiros" B. "Mesowhite"	30,000 gallons per donum every 15 days.
C. "Titsiros" C. "Mesowhite"	30,000 gallons per donum every 18 days.
D. "Titsiros" D. "Mesowhite"	30,000 gallons per donum every 21 days.

The following results were obtained :—

A.	"Titsiros	 124	okes per donum.
B.	do.	 114	do.
C.	do.	 128	do
D.	do.	 119	do.
A.	"Mesowhite"	 105	do.
B.	do.	 119	do.
C.	do.	 118	do.
D.	do.	 114	do.

No importance can be attached to these results as measurements of the quantities of water started late in the season and replications were not enough to permit statistical reduction of the results.

(5) VARIETY TRIALS.

The following varieties were grown side by side in plots of about two donums each and the following results were obtained :—

Variety	*Yield per donum*	*Ginning output*
—	—	—
		per cent.
" Mesowhite "	93.69	28.50
" Giza II "	81.19	34.18
" Sakha IV "	62.01	32.04
" U. 4 "	83.25	29.63
" Giza VII "	68.18	32.66
" Sakha II "	76.73	32.14
" Sakelaridis "	43.16	32.54
" Cyprus Select "	79.48	27.16
" Nahda "	52.76	33.11
" Giza III "	59.27	31.79

Of the foreign varieties " Mesowhite " again gave the highest yield. The Egyptian varieties were superior to the local " Mesowhite," " U. 4 " and " Cyprus Select " in ginning output.

ADVICE TO COTTON GROWERS.

(1) Sow irrigated cotton not later than the end of April ; give at least six irrigations up to the beginning of September at intervals of fifteen days and hoe after the first, second and third irrigations at least.

(2) When sowing dry (unsoaked) seed and on dry land use eight to ten seeds per hole to insure a better stand. Always sow irrigated cotton on the side of the ridge making long ridges in well-levelled land short ones on more uneven land.

(3) When sowing dry cotton do not wait for the late rain which usually comes in May ; sow, if possible in April, any subsequent rain will do good to the young plants and will not harm them as is generally believed.

(4) Hoe dry cotton as regularly as possible, as much of the soil moisture is lost through weeds growing in the cotton field.

(5) Pick cotton directly from the plant and do not cut the bolls.

Vine Budding.

BY P. ANTONIADES, *Viticulturist and Wine Expert.*

VINE budding during the period of active growth has never hitherto been practised in Cyprus in the same way as budding is practised with apples and other fruit trees.

Demonstrations of vine budding were arranged last year in a number of vine-growing villages of Limassol and Paphos Districts. The demonstrations were successful and practically no failures occurred, while by the cleft grafting method (which is the method usually employed in Cyprus in propagating selected grape varieties), failures are as high as 50%.

The reason why the difference in the proportion of failures is so great is due to the fact that with budding no treatment or after care is required, while with cleft grafting the vines require special treatment during the post-grafting period.

Vine budding is easily done. It is carried out when the eye is fully developed and while the shoot is still green and the bark easily detached.

The bud produces a strong shoot during the same summer, which can bear fruit in the following year and sometimes during the same summer.

The best time for vine budding is the end of May and beginning of June. If budding is done late in the season when the eye or bud is dormant, it will not produce any shoot until the following spring.

Budding is carried out in the following manner :—

The vine shoot selected for budding is cut horizontally. An incision is then made below the eyes in the shape of a T (single) or I (double) so that the two sides of the incision can be opened to expose the cambium. The bud is inserted below the bark next to the cambium and held in position firmly by tying with raffia.

The bud is prepared by making two transverse incisions half-an-inch above and half-an-inch below an eye, and a verticle cut is then made to unite the two transverse incisions so that the bud may be easily detached.

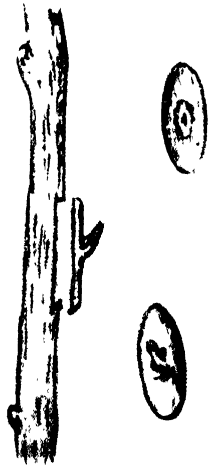
All vine growers are recommended to try vine budding especially on trellised vines and young vines from 2 to 4-years-old. It is not recommended for old vineyards as it would mean the formation of a new head, higher than the head already formed by local pruning and if the old head was cut away, a large wound might result, endangering the vine.

If it is desired to carry out budding on old vineyards it is recommended that the shoots below the head be budded. If the budding is a success the whole of the old vine above the budded shoot may be removed and the vine is regenerated without loss of crop during the year of budding.

The only disadvantage in budding is the risk in transporting buds when suitable budwood is not available close at hand.

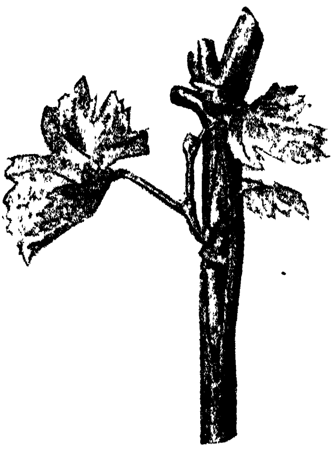
DIAGRAMS OF VINE BUDDING.

1.—Incision on vine shoot selected for budding.



2.—Budwood.

3.—Inserted bud tied with raffia.



4.—Growth after successful budding.

Publications Reviewed.

VERNALIZATION AND PHASIC DEVELOPMENT OF PLANTS.

(Bulletin No. 17 of the Imperial Bureau of Plant Genetics).

VERNALIZATION is a subject which has intrigued agriculturists in all parts of the world since it came to prominent notice in recent years and the production of a new Bulletin which embodies an exhaustive study of this subject in its widest aspect is a welcome addition to agricultural literature.

The theory and general principles of vernalization are roughly that plant growth and development are two distinct and separate phenomena. By growth is meant increase in size of the plant and development includes flowering and reproduction. Either of these processes may proceed independently of the other and according to the new theory the plant may be treated in such a way so that the one may proceed to the exclusion of the other.

The technique of vernalization is the special treatment of seed before sowing under suitable conditions of light, temperature, humidity and other factors to obtain accelerated development and when the vernalized seed is sown in the ordinary way accelerated development results and the crop ripens earlier.

Early ripening of certain crops is an important factor and if the application of vernalization may be regarded as a practical agricultural measure, it will be of considerable economic importance in its application in such countries where climatic conditions limit the period of growth or in the case of such crops where the difference of a few days in placing the product on the market is of vital importance. There is some doubt as to whether vernalized sowings give an increased or decreased yield.

Vernalization is the Latinized equivalent of a Russian word which means "transformation of winter forms into spring." T. D. Lysenko, who headed the Odessa school of plant physiologists, originally brought the idea of vernalization to prominence.

The new Bulletin is issued jointly by the Imperial Bureaux of Plant Genetics, Aberystwyth and Cambridge, and it constitutes a clear indication of the manner how the Imperial Agricultural Bureaux make available information on subjects of scientific research which normally do not come to notice unless the agricultural research worker has access to and is able to make use of the agricultural literature of the particular country from where reports of the original research work have emanated.

The contents of I.A.B. Bulletin No. 17 comprise a foreword by Sir David Chadwick, a comprehensive study of the research in the Soviet Union on vernalization and notes on results on work on vernalization in countries other than the Soviet Union.

The Bulletin deals with the available information on this controversial subject from all possible points of view and the publication should be of special interest to the Empire agriculturist who wishes to be *au fait* with the possibilities of this new trend in agricultural research.

A. P.

Live-stock Notes.

THE photograph published at the frontispiece of this issue is of the Dairy Shorthorn Bull "Ilford Ambassador" the 5th imported from England in December, 1935.

The Manager, Government Stock Farm, Athalassa, reports that Cow No. 321 shown below (Fig. 1) has completed her third lactation. She is a crossbred cow (Dam. Shorthorn : Sire Friesian) and was born on the 19th October, 1930. She calved her first calf on 12th May, 1933. In her first lactation she gave 6,494 lbs. of milk in 313 days. In her second lactation she gave 8,774 lbs of milk in 264 days. She calved for the third time on the 3rd May, 1935, and has given 11,618 lbs. of milk in 297 days. This is equivalent to 4,150 okes or 14 okes per day. The butter fat content in this lactation averaged 3.55% which is equivalent to a yield of 412½ lbs. of butter (147 okes) or nearly 10lbs. (3½ okes) of butter per week. This yield is believed to be a record for Cyprus.

Figures 2 and 3 show ewes being fed and milked in the specially-constructed milking stands used at Athalassa.

The ewes soon become accustomed to them and learn to run up the sloping platform of their own accord. After milking is completed the door on which the food box is attached is swung open and the ewe runs down the other platform.

Reference was made to this method of milking in an article on "The Breeding and Management of Sheep in Cyprus" which was published in the *Cyprus Agricultural Journal*, Vol. XXX, December, 1935.

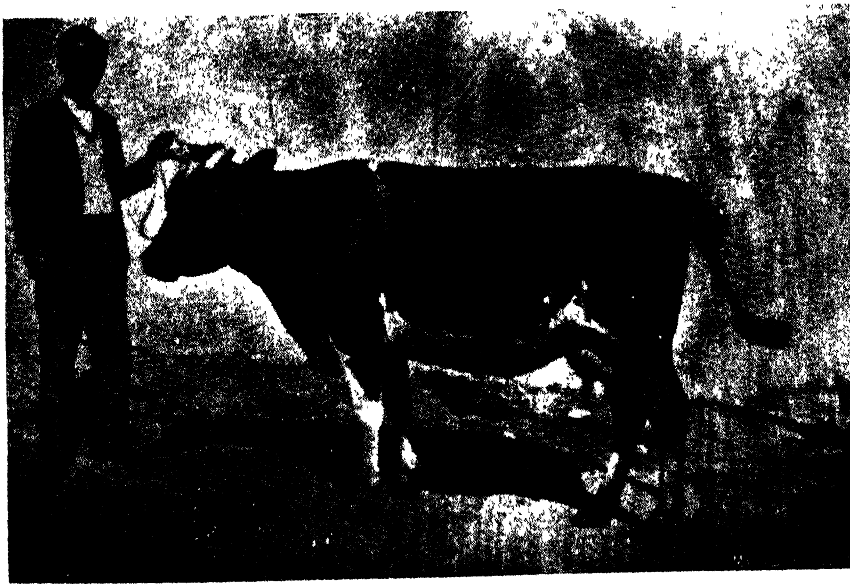


FIG. 1.—Dam. Shorthorn : Sire Friesian, a Crossbred Cow.

FIG. 2.—Ewes fed at Athalassa.

FIG. 3.—Ewes being milked in specially-constructed Milking Stands.

The Horse Breeding Law, 1930.

LIST OF STALLIONS LICENSED FOR 1936.

NICOSIA DISTRICT.

Village		*Owner's name*		*Reg. No.*
Akaki	..	Michael Th. Rafti	..	29
do.	..	Elias M. Tsinga	..	203
Argaki	..	Polyvios Theophani	..	153
Astromeritis	..	Christoforos Evangeli	..	26
Elea	..	Rejeb Ahmed	..	254
Kalokhorio	..	Yioryis Papaconstantinou	..	262
Lefka	..	Yiangos G. Boyiadji	..	20
Lymbia	..	Andronikos Petri	..	32
do.	..	Kyr. Constantinou	..	33
Mammari	..	Sotiris Ioannou	..	206
Morphou	..	Vasilis T. Spanos	..	18
do.	..	Andreas Ahapittas	..	249
Nicosia	..	Haji Costas Haji Panayi	..	62
Philia	..	Towlis Haralambou	..	255
Yeri	..	Yeoryos Petri	..	16
Yerolakkos	..	Haralambos Sophokli	..	194
		LARNACA DISTRICT.		
Alaminos	..	Salih Jumaa	..	64
Aradhippou	..	Costis Kyriakou	..	15
do.	..	Lefteris Towli	..	225
do.	..	Gregoris Sava	..	261
Athienou	..	Yiangos N. Kalapodha	..	22
do.	..	Haris Antoni	..	66
do.	..	Costas N. Haji Vrashimi	..	96
do.	..	Vasilis M. Phiakou	..	159
Kophinou	..	Hussein Handji Ibrahim	..	209
Vorokini	..	Panayis Theodosi	..	106
do.	..	Haral. A. Chapoulis	..	220
		FAMAGUSTA DISTRICT.		
Angastina	..	Gavriel G. Kamenou	..	260
Asha	..	Antonis Michael	..	92
do.	..	Demetris Kounallis	..	208
do.	..	Christos Haji Lavithi	..	234
do.	..	Kyriakos Antoni	..	239
Ayios Andronikos	..	Spyros Yeoryi	..	65
do.	..	Christofis Hambi	..	240
Ayios Elias	..	Constantis Stylli	..	246
do.	..	Therapos Haji Michael	..	256
Ayios Seryios	..	Antonis S. Gizas	..	68
Ephtakomi	..	Loizos Hambaka	..	219
Famagusta	..	Ibrahim Mehmet Kallika	..	211
Galatia	..	Akil Mustafa Gonie	..	54
Komi Kebir	..	Kyriakos Antoniou	..	48
Kondea	..	Theocharis Alexandrou	..	193
do.	..	Christos Hanni	..	259
Kouklia	..	Mehmed H. Kokkinos	..	215
Lefkoniko	..	Mehmed Salih	..	38

Village		*Owner's name*		*Reg. No.*
Lefkoniko	..	Christos Haji Symeou	..	41
Leonarisso	..	Chrysanthos Panayi	..	56
Lysi	..	Minas Lysandrou	..	80
do.	..	Artemis Haji Constandoura	..	227
Marathovouno	..	Loukas Poutsaras	..	43
Melanagra	..	Kallis Kyriakou	..	60
Milea	..	Panayis Michael Pavli	..	247
do.	..	Loizos Panayi	..	257
Ovgoros	..	Djafer Emin A. M. Mustafa	..	213
Paralimni	..	Andreas K. Xiouri	..	72
do.	..	Evangelis Haji Vraka	..	172
do.	..	Evangelis Haji Vraka	..	245
do.	..	Nicolas G. Tsiakouras	..	210
do.	..	Demetris A. Maouris	..	244
do.	..	Avraamis Anastasi	..	258
Peristeronopiyi	..	Andreas Louka	..	45
do.	..	Const. K. Haji Yeoryi	..	73
Phrenaros	..	Kyriakos Theori	..	71
do.	..	Adamos Haji Theori	..	226
Rizokarpaso	..	Panayiotis K. Sakka	..	171
do.	..	Christofis N. Koulia	..	241
do.	..	Nicolas Chr. Barbotta	..	251
Sotira	..	Vasilis Demetri	..	252
Trikomo	..	Marikou Kyriakou	..	224
do.	..	Christos Demetri	..	101
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ROBERT J. ROE,
Chief Veterinary Officer,
Inspector of Horse Breeding.

17th March, 1936.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

DECEMBER, 1935.

District and Station	Shade temperature Mean Maxim	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	65.61	46.26	0.88	10	0.42	2.58	—
Athalassa		—	0.55	5	0.40	2.40	
Morphou		—				2.24	-
Makhæras		-	2.00	2	1.65	4.65	-
Famagusta District :							
Famagusta	69.45	48.29	2.24	10	0.82	3.77	--
Akhyritou	66.00	46.20	1.38	7	0.55	2.96	—
Rizokarpaso ...	-	—	3.14	9	0.95	5.30	-
Lefkoniko		-	0.63	7	0.17	3.10	---
Larnaca District :							
Larnaca	67.00	49.00	1.25	9	0.38	5.16	—
Lefkara			2.22	7	0.65	5.31	-
Limassol District :							
Limassol	67.90	50.77	1.55	11	0.50	4.37	-
Saittas			2.43	8	0.62	2.92	—
Trikoukkia... ...	—				—	6.58	—
Alekhtora	-	-	3.53	8	1.86	4.95	--
Paphos District :							
Paphos		-	2.10	14	0.40	4.39	—
Polis...	--	---	2.67	8	1.25	3.61	—
Kyrenia District :							
Kyrenia	66.25	54.20	2.04	13	0.51	4.96	—

***Note.*—Compiled from returns furnished by Public Works Department.**

JANUARY, 1936.

District and Station	Shade temperature: Mean Maxim.	Shade temperature: Mean Minim.	Rainfall: Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	64.00	44.37	1.22	6	0.90	3.30	
Athalassa	–		0.85	4	0.73	3.07	
Morphou	67.65	44.26	1.15	7	0.44	2.80	
Makhaeras			3.10	3	2.10	5.34	—
Famagusta District :							
Famagusta	67.36	46.06	4.90	8	1.45	4.12	
Akhyritou	64.00	44.00	2.86	9	0.74	2.91	
Rizokarpaso ...	—		9.37	8	5.67	5.65	
Lefkoniko	—		0.92	4	0.50	3.22	
Larnaca District :							
Larnaca	66.00	46.00	3.07	10	1.60	5.13	
Lefkara			3.76	7	1.76	4.30	
Limassol District :							
Limassol	65.55	46.94	3.55	11	2.37	3.89	
Saittas			3.37	6	1.45	5.62	
Trikoukkia	44.74	36.00	2.81	5	1.25	5.78	
Alekhtora			3.24	8	1.58	4.05	
Paphos District :							
Paphos			3.55	11	0.60	3.98	
Polis...			1.43	6	0.45	3.34	
Kyrenia District :							
Kyrenia	64.11	50.10	2.17	12	0.69	4.57	

FEBRUARY 1936.

District and Station	Shade temperature: Mean Maxim.	Shade temperature: Mean Minim.	Rainfall: Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District :							
Nicosia	62.00	44.07	1.95	14	0.54	2.87	
Athalassa	-	-	1.57	7	0.84	2.58	
Morphou	73.48	43.83	3.13	14	0.78	2.88	
Makhaeras			6.58	6	3.20	5.54	
Famagusta District :							
Famagusta	65.86	44.10	1.88	10	0.59	3.39	
Akhyritou	62.30	42.50	1.82	9	0.61	2.52	
Rizokarpaso ...			2.62	7	0.70	4.37	
Lefkoniko			1.99	10	0.71	2.76	
Larnaca District :							
Larnaca	64.00	44.00	2.14	12	0.94	3.79	
Lefkara	--		2.46	9	0.85	4.27	
Limassol District :							
Limassol	64.41	45.45	3.26	14	0.60	3.48	
Saittas	-		6.82	11	2.50	6.28	
Trikoukkia	45.13	33.10	8.80	9	1.45	6.94	
Alekhtora	--		4.01	9	0.74	4.48	
Paphos District :							
Paphos	—	--	4.22	11	1.20	4.58	
Polis...	--	--	4.29	10	1.10	4.08	
Kyrenia District :							
Kyrenia	62.26	49.23	5.68	15	1.15	5.52	

***Note.*—Compiled from returns furnished by Public Works Department.**

EDITORIAL AND ADVERTISEMENT NOTICES

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

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SCALE OF ADVERTISEMENT CHARGES.

A special reduced rate is charged for all advertisements inserted. As the Journal is circulated throughout the Colony and copies are sent to all Colonies Overseas it may be regarded as a valuable medium for advertising.

The following are the rates in force :—

COVER—Full page, 1 year or 4 insertions ...	£2	0	0
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Advertisements should be written on one side of the paper only and should reach the Editor, *Cyprus Agricultural Journal*, not later than the 10th of the month of issue.

The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

Table Showing Distribution of Stud Animals at the Stud Stables and Government Stock Farm, Athalassa on 1st April, 1936.

Station	*Stallion*	*Jack Donkey*	*Bull*	*Breed*
—	—	—	—	—
Athalassa ..	Corby Bridge ..	No. 42 (Spanish) ..	No. 480 (Ambassador) ..	Shorthorn
	Moleskin ..	No. 38 ..	No. 462 ..	Crossbred
	Mazarin ..	— ..	No. 456 ..	Kerry
	—	—	No. 469 ..	Cyprus
Ay. Theodoros	Pitchford ..	No. 50 ..	No. 461 ..	Cyprus
Famagusta ..	Friars Flutter ..	No. 51 ..	No. 443 ..	Cyprus
Larnaca ..	Lifeline ..	No. 52 ..	No. 455 ..	Crossbred
Lefkoniko ..	Marcher Lord ..	No. 54 ..	No. 468 ..	Cyprus
Limassol ..	Canterbury ..	— ..	— ..	—
Morphou ..	— ..	No. 47 ..	— ..	—
Nicosia ..	— ..	— ..	No. 450 ..	Crossbred
Paphos ..	Llwynog's Model	No. 41 ..	No. 454 ..	Kerry
			No. 459 ..	Cyprus
Polis ..	do. ..	No. 49 ..	No. 451 ..	Kerry
Rizokarpaso ..	— ..	No. 45 ..	No. 460 ..	Cyprus
Vatili ..	Waterkoscie ..	No. 48 ..	No. 458 ..	Cyprus

Notes: 1.—There are also Boars at all the above stations except Nicosia, Morphou and Limassol and there are he-goats at all stations except Morphou and Limassol.

2.—The Stallion at Limassol will travel to Evdhimou and back, that at Ayios Theodoros will travel to Rizokarpaso and back and that at Paphos to Polis and back, every month.

3.—Boars and he-goats may be issued on loan to *bona fide* applicants upon application to the Director of Agriculture or Manager Stock Farm, Athalassa.

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Cyprus Persian Wheel "Alakati."

The
Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXXI, Part 2 JUNE, 1936 Price 3cp.

EDITORIAL NOTES.

Agricultural Situation.

The outstanding feature affecting the agricultural situation and outlook during the past quarter has been the heavy and continuous rains during May and the exceptionally cool weather in the early part of June.

The rain for May is well above the average over an extended period of years for practically all parts of the Island and this unseasonal weather has had a disturbing effect on the agriculture of the Island. Considerable damage was caused to harvested cereals on the threshing floor and to sheaves lying in the fields and standing cereals were badly damaged by rust. The variations in temperature are likely to affect next season's olive and citrus crops owing to the adverse effect at the time of flowering. Cherries and other stone fruits suffered from the excess of rains and the almond crop is poor. On the other hand all summer crops will benefit and the production of apples will be good.

The prices for cereals reacted to the climatic conditions and the price of wheat soared to 5*s*. per kilé but it is expected the price will drop when the delayed threshing continues and ample supplies of local grain come on to the market.

Shipping Services for Citrus Fruits.

The following resolution was passed at a meeting of the Cyprus Shippers' Association held on the 25th April, 1936 :—

"This Council considers that conditions of shipment of citrus fruit are not likely to be improved unless all Shippers of such fruit are prepared to join together to deal as a whole with Shipping Companies and to guarantee quantities for shipment. It, therefore, recommends that all shippers of oranges be called upon to join an Association of Orange Shippers, which should be a section of the Association for the purpose of securing better shipping service,"

A Sub-Committee consisting of the Director of Agriculture, Comptroller of Customs and Inland Revenue and Mr. Zenon Pierides was appointed to deal with the proposal and on the 17th May a meeting was held at Famagusta which all exporters of citrus fruits were invited to attend. As a result of the Famagusta meeting a Committee was elected consisting of Messrs. Ioannis Ioannou, Prodromos Papadopoulos and Ioannis G. Marangos for drawing up the Rules of the proposed Association of Orange Shippers for consideration by the Cyprus Shippers Association.

* * * * * * *

INSPECTION OF ONIONS FOR EXPORT.

Regulations under the Agricultural Produce (Export) Law, 1933, providing for the inspection of onions before export are likely to be introduced at an early date. These regulations are based on the Agricultural Produce (Potato) Export Regulations, 1935, now in force.

* * * * * * *

RURAL EXTENSION EDUCATION.

Mr. B. J. Weston, Superintendent of Agriculture, left Cyprus on the 9th June, 1936, on vacation and duty leave. Mr. Weston will visit Macedonia for a short period to study the development made in Rural Extension Education there which the Near East Foundation have conducted for some years.

* * * * * * *

DEVELOPMENT OF TRADE WITH PALESTINE AND EGYPT.

Mr. G. M. Pietroni, the Trade Development Officer, represented Cyprus at the Levant Fair at Tel-Aviv early in May. Mr. Pietroni returned to Cyprus *via* Egypt where he made investigations on the marketing of Cyprus products in Egypt. Various travel agencies were also visited with a view to stimulate further interest in Egypt to the advantages of Cyprus as a tourist and holiday resort.

AGRICULTURAL SHOWS.

An Agricultural, Animal and Industrial Show was held at Larnaca on the 31st May, 1936, on the occasion of the " Kataklysmos " festival.

The new Municipal Market was opened by His Excellency the Governor during the period of the Show and Fair and these events attracted a considerable number of visitors to Larnaca.

Forthcoming Shows during the year are :—

8th September, 1936, Lysi Agricultural and Animal Show.

4th, 5th and 6th October, 1936, Paphos District Agricultural Show to be held at Ktima.

Proposals are also under consideration to hold Shows at Kyrenia, Morphou and Limassol, but the dates have not yet been fixed. The Larnaca Poultry Show will be held during December, 1936, and proposals are under consideration for village fruit and vegetable shows at Kiti, Pervolia and Agros during the Autumn.

AWARD OF PRIZES TO SCHOOL GARDENS FOR THE SCHOOL YEAR 1935–36

The Colony prize for the best School Garden for the School Year was awarded to Anoyira School. Mr. Antonis Kontoyannis is the Schoolmaster who was in charge of the School during the year.

District and Area prizes were awarded for the best two gardens as follows :—

District or Area	*School*	*Schoolmaster*
Nicosia	Yerolakkos	M. Mavromatis and others.
,,	Peristerona	E. Sotiriou.
Lefka	Evrykhou	I. Myrianthousis.
Larnaca	Agros	M. Haji Georghiou and others.
,,	Pera Khorion	Chr. Christodoulides.
Famagusta	Yialousa	Iacovos Iacovides and others.
,,	Ayios Nicolaos	G. Avraam.
Paphos	Ayios Therapon	S. Stylianides.
,,	Yeroskipos	A. Dinglis and others.
Kyrenia	Myrtou	N. Zembilas.
Trikoukkia	Phini	H. Pantelis.

LOCUST CAMPAIGN.

The first centres for the purchase of locusts were opened on 30th March and the last centres were closed on 23rd May. For part or the whole of this period centres were open at twelve villages. The total quantity of locusts destroyed was 24,746 okes, compared with 3,774 okes last year and 162,219 okes in 1927.

The occurrence of the Moroccan locust, known as the " true locust " was considerably greater than last year, and the occurrence of the Italian locust, known as " tsakracrida," was very much greater, and several species of grasshoppers were also very abundant.

BULLETIN OF THE IMPERIAL INSTITUTE.

With effect from the January–March, 1936, issue of the Bulletin of the Imperial Institute this publication will be published by the Imperial Institute itself. The general format of the Bulletin remains unchanged but some improvements in the scope of the Bulletin have been effected with a view to appealing to a wider circle of readers. More space will be devoted to the various aspects of the work of the Institute which will include the results of the more important laboratory investigations, articles and notes on plant and animal products and a record of developments in the Public Exhibition Galleries and Cinema of the Institute. An important feature will be the section on subjects of mineral interest. The price has been reduced to 2*s*. 6*d*. per number, by post 2*s*. 9*d*. (annual subscription 10*s*. post free).

SERICULTURAL NOTES.

Production of Silk Coccoons.

Generally the rearing of silkworms seems to have been satisfactory. Although the weather during the last days of rising in some areas was rainy and wet, still owing to precautions taken by the rearers as instructed by the travelling agricultural officers the damage owing to diseases, and especially to Flasherie and Grasserie which are favoured by damp weather, was very little.

In many places lack of mulberry leaves was experienced and rearers, some of whom had uprooted a good number of mulberry trees, were obliged to buy leaves at 1–1½*cp.* per oke to feed their silkworms. On account of the depressed prices of the cocoons at present this system does not pay and rearers are advised to hatch out only such a quantity of silkworm eggs as they can be sure of feeding with their own mulberry leaves.

New cocoons appeared in the market after the 10th May and were purchased by merchants at 1*s.* per oke. Owing to the low prices a very small quantity will be offered to the market, the larger quantity being reeled for domestic use.

The total production of cocoons in Cyprus this year is estimated at 100,000 okes approximately.

* * * * * * *

Demonstrational Silkworm Rearing in Girls' Schools.

Demonstrational silkworm rearings have been carried out in 144 girls' schools in various parts of the Island, and the schoolmistresses and schoolgirls engaged in the feeding and care of the worms, and the girls followed the various stages from the hatching of the silkworm eggs to the production of the cocoons.

Many rearers visited the demonstrational rearings in their villages and saw the improved methods of hatching and rearing the worms.

Cocoons produced from these rearings are much better in quality than those produced by the old methods and many persons who were trained in these improved methods while at school now follow these methods in their own rearings.

* * * * * * *

Statement showing the number of mulberry trees 3 years old and over, in each District for the last five years.

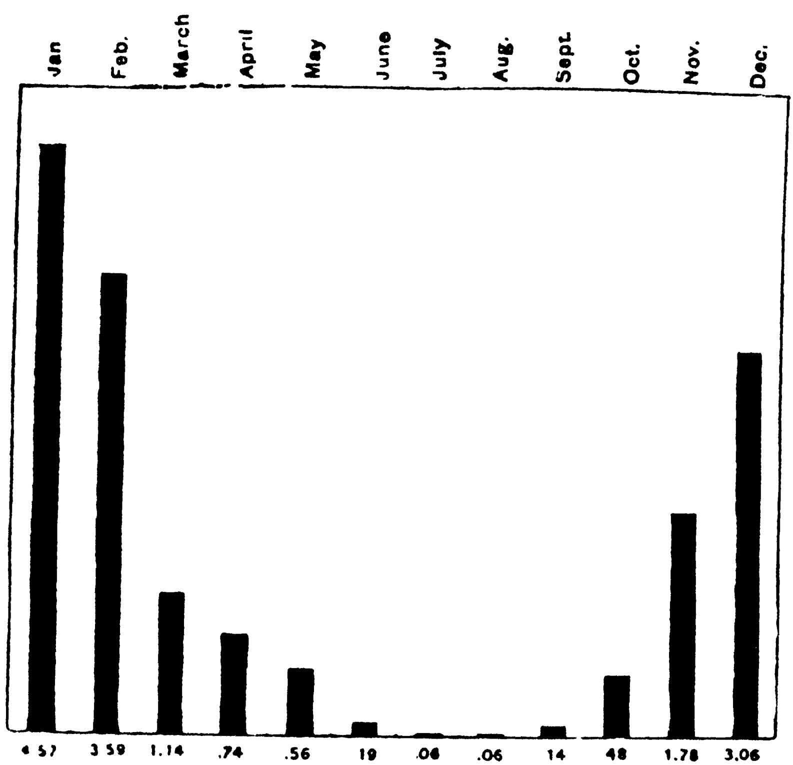
District	1931	1932	1933	1934	1935
Nicosia	76,815	85,014	89,986	92,450	97,166
Larnaca	30,343	40,120	45,161	49,687	53,802
Limassol	33,512	37,047	38,890	43,528	45,143
Famagusta	120,930	123,991	125,984	127,373	126,092
Paphos	82,615	87,297	88,353	85,779	82,978
Kyrenia	128,425	127,616	124,576	117,565	115,105
Total	472,640	501,085	513,890	516,382	520,286

Irrigation in Cyprus.

BY A. PITCAIRN, *Assistant Director of Agriculture.*

INTRODUCTION.

IRRIGATION is of considerable economic importance to Cyprus and the growing of crops by irrigation has been practised in the Island since ancient times. In the coastal and central plain areas the climate is arid in character and the average monthly rainfall of these areas for a period of ten years, which is illustrated below shows that the rainfall is distributed over the winter months with practically no rain during the hot summer months.



Average Monthly Rainfall in inches – Coastal & Central Plain

10 Years 1925 - 1934

This seasonal distribution of the rains permits the practice of a system of dry farming and such crops as cereals, beans, vetches, olives, almonds, vines and other crops are produced in considerable quantities. With the application of more modern and scientific methods of agricultural practices the yield of the crops produced by dry farming would be increased and the possibilities of crop failures in years of drought or during season when the distribution of the rainfall is unfavourable would be lessened.

Where irrigation water is available more intensive methods of farming are practised and a wider range of crops are produced. Without irrigation it would not be possible to produce in Cyprus such crops as citrus fruits and most of the fodder and summer crops which are now grown.

Owing to the number of crops which can be produced by dry farming being limited, irrigation is necessary for the needs and development of the Island but there are many areas where irrigation water is not available and there are also lands which are unsuitable for development under irrigation, therefore, further progress in agriculture in Cyprus lies in improving the existing system of dry farming and supplementing it by irrigation farming wherever it is possible.

The value of water to be used for irrigation purposes depends upon the quantity of solids contained in solution in it. This can only be determined by analysis and in view of the great variation in the quantity of soluble salts found in the irrigation waters of Cyprus it is desirable that supplies should be analysed.

If unsuitable irrigation waters are avoided it is rarely that soils in Cyprus become brackish. The nature of the soil, natural drainage and amount of winter rainfall all combine to prevent an accumulation of Sodium salts.

SOURCES OF IRRIGATION WATER.

The main sources of water supplies for irrigating crops in Cyprus are derived from perennial springs, mountain springs and streams, wells, chains of wells and storage reservoirs.

Crops and agricultural lands are also irrigated in winter by conveying to the fields silt laden flood waters from torrents in river beds and water courses.

The capacity of the large perennial springs such as the Kythrea and Lapithos supplies practically never varies during the year or from year to year. Supplies from mountain streams in years of normal rainfall are usually sufficient to supply the needs of the cultivators holding the water rights for the production of summer crops but these supplies diminish considerably towards the end of summer. The replenishment of well water supplies in Cyprus depends mainly on the annual rains and quantity of snowfall on the mountains in winter. During seasons of drought or following winters of shortage of rainfall the underground water supplies are often considerably depleted. Silt laden supplies depend entirely on the seasonal rainfall and can only be utilized irregularly as climatic conditions permit.

The supplies from perennial springs and mountain springs and streams are mostly used by the village communities in the neighbourhood of these sources. In some cases these supplies are not developed to the best advantage owing to any attempts to improve the distribution of the water being hampered by the existence of ancient water rights. Efforts are made from time to time to improve on the utilization of this kind of supply with a view to bringing an increased area under irrigation by more economical use of the water.

Most of the irrigation water used in Cyprus is derived from wells on private properties. Wells are either circular or squared and the sides lined according to the nature of the well and means to be employed to raise the water to the surface.

Chains of wells are made by sinking a number of wells at regular intervals, linking up the wells underground by tunnels, and bringing the water to the surface by gravitation. In some places chains of wells extend to a distance of over two miles and the capacity of a chain of wells may be as much as 650,000 gallons of water per day.

Owing to the varied character of the geological formation of Cyprus the possibilities of finding underground water is problematical in many areas. A few years ago the Government organized a systematic scheme for drilling for water by portable well drilling machines. A number of valuable irrigation supplies were found and the success in this venture has stimulated interest by private enterprise in the search for underground supplies.

There are three irrigation storage reservoirs which are situated in the eastern Mesaoria. These reservoirs which were constructed by Government along with certain other irrigation works between the years 1899 and 1901 are at Kouklia, Akhyritou and Syngrasi. The object of the Mesaoria scheme was to impound surplus flood water from the Pedias and other rivers for irrigation purposes and to reclaim swampy lands. Large areas of swampy land were reclaimed and converted into agricultural land but the irrigation scheme was not altogether a success mainly on account of the irregularity and insufficiency of the supply due to failure to collect sufficient water in years of drought and difficulties in controlling the flood waters during years of ample rainfall. Although the three reservoirs in their present form are designed to command an area of approximately 12,000 acres they are used on a very modified scale for irrigation purposes and not more than 4,000 acres are likely to be irrigated in any one year.

Irrigation by conveying silt laden flood water from river beds during the winter rains fulfils two purposes :—

(*a*) Irrigating cereals and other winter crops following spells of drought.

(*b*) Flooding fallow fields in preparation for planting summer crops especially cotton, melons and water melons.

This practice especially for the latter purpose plays an important part in the agriculture of Cyprus and besides its value from an irrigation point of view it has a most beneficial effect on the land. This system of irrigation has been practised from time immemorial and traces of ancient dams, canals and water channels are still evident. The Venetian system for controlling the flood water in the river Tremithias at Kiti village in Larnaca District is still in existence. A new dam has been built on the site of the old Venetian dam and several other new dams have been constructed.

Besides the above sources of supplies of irrigation water efforts have been made to form storage reservoirs in natural depressions in mountain valleys but at present no important projects of this nature or any other important source of irrigation supplies have been developed.

EXTENT OF IRRIGATION.

During the year 1935 the estimated area of irrigated and unirrigated crops produced in Cyprus were :—

Kind of Crop	Area planted: Irrigated donums	Area planted: Unirrigated donums	Remarks
Wheat	—	573,250	When possible wheat fields are irrigated by silt laden flood waters.
Barley	—	346,859	
Oats..	—	35,912	
Maize	1,107	—	
Favetta	—	18,217	
Vetches	—	171,440	
Broad beans ..	—	14,645	One or two winter irrigations given before crop reaches maturity.
Potatoes	12,329	6,165	Two crops grow each year winter crop irrigated according to season. Summer crop dependent upon irrigation.
Cotton	10,739	32,217	
Sesame	—	7,076	
Cumin	—	12,878	
Onions	2,758	1,379	
Tomatoes	2,073	1,036	
Other vegetables ..	9,695	—	Includes colocasia, beans, cauliflowers, etc.
Citrus	11,700	—	
Other fruit trees ..	2,671	220	Includes pomegranates and deciduous fruits.
	53,072	1,221,294	

The irrigated areas referred to in the above and subsequent returns are crops irrigated from perennial water supplies. Fields irrigated by silt laden flood waters and cultivated land under vines, olives, carobs and almonds are not included.

The percentage of irrigated crops dependent entirely upon irrigation to non-irrigated crops of the total area under cultivation in 1935 was only some 4.5%. New areas of irrigable lands are being developed as irrigation water supplies become available especially for the development of citrus production.

The irrigation of winter crops by directing winter flood waters and surplus spring water is carried out extensively and at least some 10% of the cultivated area receives one or two irrigations in this manner.

The approximate percentage of areas of land irrigated in Cyprus from the principal sources of supply are :—

Source	Area under irrigation donums	% of total
Perennial springs and streams	18,000	33.9%
Wells	28,000	52.8%
Chains of wells	5,000	9.4%
Reservoirs	2,000	3.9%

MACHINERY AND APPLIANCES FOR MAKING IRRIGATION WATER AVAILABLE FROM WELLS.

The various types of water lifts in use in Cyprus for raising water from wells may be classified as follows :—

(*a*) Hand lifts adapted to lift water from a depth up to 25 feet ;

(*b*) Lifts operated by animal power for raising water from a depth up to 70 feet ;

(*c*) Windmills for lifting water from wells up to 100 feet deep ;

(*d*) Pumps and engines for shallow, medium and deep wells.

Hand types of water lifts are not used to a great extent for raising water for irrigation purposes in Cyprus. In some areas the Shadoff, locally known as the *Katia* or *Zygotiri*, is used on shallow wells not exceeding a depth of 25 feet for irrigating vegetable fields not more than one donum in extent. The Cyprus Shadoff consists of two wooden posts about 3 feet apart with a horizontal piece of wood joining the top to which is suspended a lever made from a tree branch. A forked tree stump is often used as the main post. On one end of the lever a stone weight is attached while from the end over the well a bucket or receptacle for raising the water is lowered into the well by a rope. This type of water lift is operated by one or two persons.

Water Wheels.—The most common method of raising water for irrigation in Cyprus is by the Persian water wheel locally known as an *alakati*. This type of water lift is eminently suitable for the small peasant proprietor who has an adequate well water supply at a depth of not more than 70 feet. The cost of maintenance of this type of water lift is practically negligible and the complete installation is made locally at a cost not exceeding £15. The wheel is operated by animal power, and the only maintenance expense is the supply of a small quantity of

lubricants for the bearings. If the installation is properly worked and the mineral contents of the water does not affect the iron the life of the appliance is approximately 25 years. The capacity of a Cyprus Persian wheel with seventy buckets is 1,800 gallons per hour and the approximate area which can be irrigated from the supply of an *alakati* is 6 donums.

In bygone days the *alakati* was completely made of wood but the various parts are now made of iron. In view of the importance of the *alakati* for irrigation in Cyprus the following description of the Cyprus locally-made Persian wheel is fully illustrated by a series of photographs. The description is prepared from a print drawn to scale by the Public Works Department and the photographs were kindly lent by Mr. Ramsay, Water Engineer, and Mr. Toundjian, of the Public Works Department.

The power pole is attached to a timber bearing fixed between two stone pillars and holding the horizontal wheel or skeleton drum in position. The horizontal wheel is four feet in diameter with 32 teeth approximately.

A vertical wheel also with 32 teeth approximately is adjusted over the well. A drum is rivetted to the vertical wheel and the water is raised in buckets attached to an endless chain which passes over the drum and deposits the water in the section of the drum directly underneath the bucket, the water then passes out through a discharge casting into a channel. The drum has a truncated cone centre 22″ in diameter at the larger end and 6″ in diameter at the smaller end. It is divided into 9 sections which are completely isolated and each section allows the water to pass through the discharge casting which is divided into 9 corresponding sections. When the wheel is operating a rapid outflow of water is obtained without any risk of returning the water to the well. A lever is adjusted at the side of the vertical wheel for preventing the drum reversing when the animal stops.

Windmills.—Raising water from wells by windmill is popular in many parts of Cyprus. This type of equipment is usually found installed in the grounds of private dwelling-houses for supplying water to irrigate the garden or in small fruit gardens 4 to 5 donums in extent. In the dry season there is usually enough wind of sufficient velocity to keep up the supply of water but an adequate storage tank is necessary to keep a reserve supply of water in hand.

The type of windmill in use in Cyprus is of modern construction with a vertically fitted wheel on a 40′ tower. The initial cost of this type of equipment is rather high for the relatively small area which can be irrigated and this kind of lift has gradually been replaced by pumps and engines.

The cost and capacity of a windmill depends mainly on the size of the wheel and the following figures are given as an approximate guide :—

Size of wheel	Approximate prices	Capacity of water per hour
8 feet	From £37	1,000 approximately
10 ,,	,, £50	2,000 ,,
12 ,,	,, £65	3,000 ,,
14 ,,	,, £75	4,000 ,,

Power Pumps.—The centrifugal pump driven either by electric motor or internal combustion engine is the type most favoured by the local farmer.

Only in exceptional instances, however, does the quantity of water available necessitate the installation of a pump having a delivery pipe greater than 3″ diameter.

Vertical plunger pumps, generally single acting, having one or more plungers have also a considerable following amongst the farmers, but as they are generally of greater initial cost and require greater attention they are being gradually supplanted by the more easily installed and operated centrifugal.

In many of the areas where Government artesian borings have revealed supplies of such quantity and at such depths as to effectively preclude the adoption of either of the above types of pump, proprietors have installed the turbo deep well unit having a delivery rate as high as 150 tons (33,600 gallons) per hour and driven by an internal combustion engine.

STORAGE AND CONVEYANCE OF WATER.

Storage tanks are required when the capacity of the *alakati*, windmill or power pump is less than 10,000 gallons per hour. These tanks are usually constructed of stone and their size depends upon the area to be irrigated and type of lifting installation.

The average size of a stone storage tank for a 6-donum holding is approximately 14′×14′×4′. The cost of building a tank of this size is approximately £25.

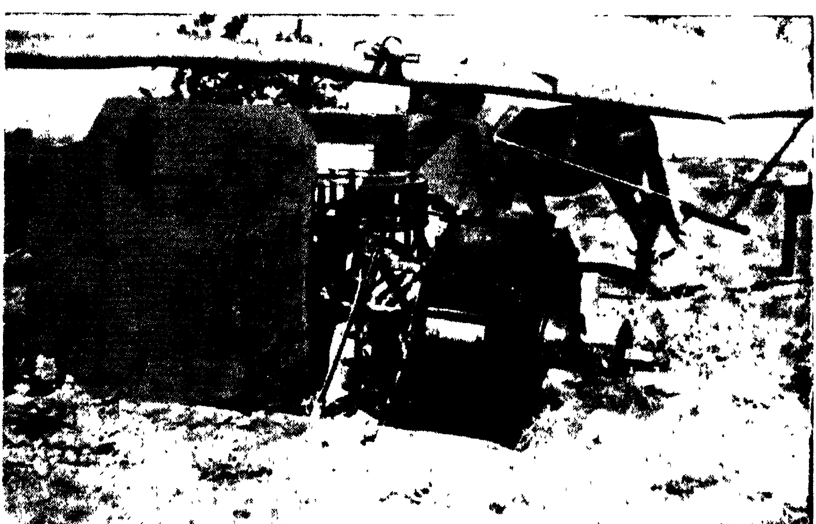
When it is desired to pump the water direct to the land, a branch channel leads the water to the irrigation channels instead of direct to the tank.

Storage accommodation is not usually provided for the perennial and chain of wells supplies as there is usually a sufficient flow of water from these sources for the irrigation purposes demanded from them and large storage reservoirs to economize in the use of these supplies or bring greater areas under irrigation have not yet been established. The surplus of these supplies is usually diverted into a river bed through which it returns to the underground supplies again.

Most of the water controlled by Irrigation Divisions in Cyprus from perennial and chain of wells supplies is conveyed to the cultivators in open earth channels and ditches.

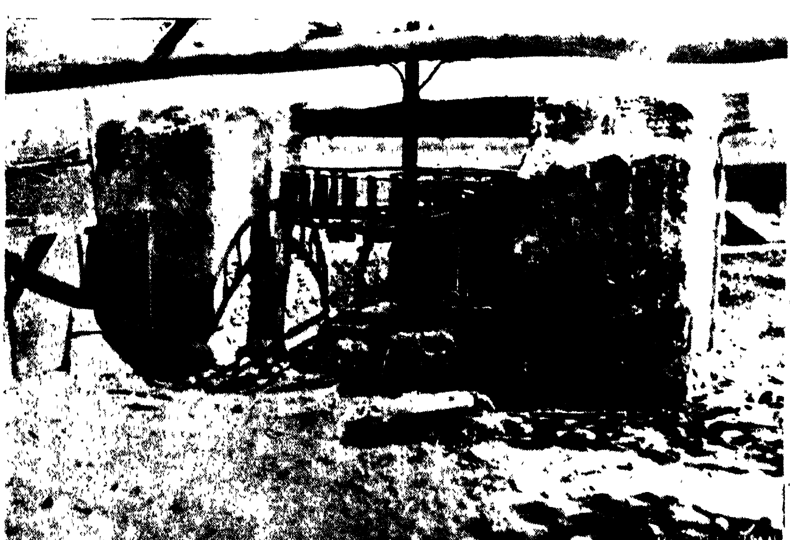
Where water is pumped to lands supplied by irrigation water from wells concrete channels are used to convey the water from the storage tank to the boundaries of the irrigable fields. The cost of constructing concrete channels depends upon the size of the channel.

Alakati-front view showing drum and vertical wheel.



Alakati-side view showing endless chain of buckets.

Alakati-side view showing discharge casting,



Alakati-back view showing horizontal wheel or skeleton drum,

The following are approximate figures for three different sizes :—

Size of channel	*Cost per foot*
14" wide × 12" deep	6*cp.* 7 *paras*
10" „ × 8" „	4*cp.* 13 „
8" „ × 6" „	3*cp.* 1 *para*

The water in most of the recently established citrus groves owned by Jewish settlers is conveyed by underground concrete pipes. This system, including value of the concrete pipes, opening for the outlet of the water and laying down the pipes cost at present approximately 4*cp.* per foot.

WATER RIGHTS AND LEGISLATION.

The legislation at present in force providing for the control of irrigation water is governed by the Government Waterworks Law, 1928, the Irrigation Law, 1931, and the Wells Law, 1896.

The Government Waterworks Law 1928 which repeals the Irrigation Law, 1897, provides for—

(*a*) All underground water (including second water) for which no measures have hitherto been taken enabling such water to be brought or raised to the surface or to run on to the surface;

(*b*) All water running to waste from any river, spring, stream or watercourse;

(*c*) All other waste water;

to be the property of the Government and written permission is required from the Commissioner of the District before any water as above described can be utilized.

All water in any river, spring, stream or watercourse, whether subject to private rights or otherwise in respect of which any waterwork is undertaken, shall after making necessary provision for private rights as provided for in the Law becomes the property of the Government.

In this Law provision is also made whereby Government has powers to take, store or divert water to construct waterworks, acquire land and remove obstructions.

If prior to the commencement of the undertaking, it appears that existing rights are likely to be affected injuriously in any way by the carrying out of any waterworks, Water Commissioners are appointed to enquire into the nature and extent of the injury to the water rights affected.

The construction of wells is provided for under the construction of Buildings, Streets and Wells on Arazi Mirié Law 1927. Under this Law provision is made whereby no well shall be sunk or constructed on lands of the Arazi Mirié category without first obtaining a permit from the Commissioner of the District in which such well is to be sunk or constructed. Practically all land in Cyprus comes under the category of Arazi Mirié which is State land, the ownership of which is held under title deed. Existing wells and water rights are safeguarded under the Wells Law, 1896.

The Irrigation Law, 1931, provides for the formation of irrigation divisions with or without Government aid for the following purposes :—

(a) The construction, improvement, maintenance or repair of any irrigation works lying wholly or in part within the lands of a village or group of villages;

(b) The protection of common waters or watercourses and for the regulation of the use thereof;

(c) The maintenance of the water rights of the proprietors.

This Law repeals the Irrigation and Water Law, 1887, and includes all works undertaken or constructed under the provisions of the Law repealed. The provisions of the law does not apply to water rights held by registered title or *ab antiquo* possession without the consent of the holders of such possession or the majority of the proprietors.

CONCLUSION.

The foregoing is a brief outline of the present position in regard to irrigation in Cyprus. No rapid strides have been made in recent years in irrigation development but there is a tendency on the part of cultivators to improve on their old established customs and to introduce methods which research in irrigation have proved to be more advantageous. Engineering investigations have been made from time to time and numerous projects for accelerated development in irrigation have been submitted to Government for consideration but owing to the conditions under which the Cypriot peasant farmer works his land, it has not yet been possible to embark on any large scale organized scheme by which the peasants could purchase adequate and assured water supplies.

Considerable progress has been made in exploiting water supplies on private properties and necessary steps are taken to instruct the cultivators in proper methods of raising, storage, conveyance, application and duty of water.

Citrus Wastage Trials, 1936.

By R. M. NATTRASS, *Government Mycologist.*

1. DEMONSTRATION OF CAREFUL HANDLING.

ALTHOUGH it is a well-known and accepted fact that wastage of citrus fruit during transit to distant markets is caused in the first instance by injuries to the fruit during picking and subsequent handling, it was considered that a practical demonstration of the benefits of careful handling would do much to impress all engaged in the citrus export industry of the necessity for exercising the utmost care during the picking and packing of the fruit.

A small trial was arranged with the co-operation of Mr. A. Panaretos, Agricultural Officer, Famagusta, to be carried out on the fruit in the groves of the Government Experimental Citrus Station.

Five cases of fruit were picked by unskilled labourers in the way usually practised in the groves. The fruit was transported in baskets by motor-lorry to the packing shed and wilted for 7 days in a heap 6 to 8 fruits deep in accordance with the usual custom. The fruit was then wrapped and cased by skilled packers in a commercial packing house.

With the carefully picked fruit the pickers were equipped with locally-made cotton gloves, they were specially instructed to exercise special care in the use of the clippers and in every instance the stalk was clipped a second time before the fruit was placed in the collecting basket. The subsequent handling of the fruit resembled that of the control lot except that wilting was done in a layer two deep for the same period of 7 days, and until it was wrapped the fruit was handled at every stage with gloves. It was found that the wearing of a glove on one hand only was necessary for wrapping the fruit and that once accustomed to the feel it did not seriously affect the speed of the work.

The cases were transported by rail to Nicosia and placed in store for a further period of 23 days, *i.e.* 30 days from the time of picking. During this period the temperature of the store remained fairly constant at 60°F.

The cases were opened on 6th March and counts made of sound and wasted fruit with the following results :—

	Total No. of fruits	*Wasted fruits.*	*% Wastage.*
Careful handling	902	15	1.6
Control..	772	66	8.5

It is considered that injury to the fruit during picking and handling is caused largely by the points of the clippers bruising the fruit ; by badly cut stalks projecting from the fruit, and by the thumb nails of pickers and packers.

The above preliminary trial demonstrates that wastage can be considerably reduced by the exercise of due care and simple precautions.

2. CHEMICAL TREATMENT OF FRUIT AND WRAPPERS.

The preliminary trials carried out in the 1934–1935 season (2) showed that treatment of the fruit with " Shirlan," which had previously given good results in South Africa (1), and the use of wrappers impregnated with iodine showed considerable promise and warranted

a further trial. It was also necessary to ascertain the effect of such treatments on fruit arriving in Europe before further recommendations to the Cyprus producers could be made, and arrangements were made with the Secretary of the Cyprus Information Office in London, for experimentally treated fruit to be examined on its arrival at Covent Garden Market.

In previous consignments heavy losses had occurred through contact wastage, and it was considered that a more efficient method of isolating individual fruits or layers might do much to check this form of wastage. The two methods tried were the use of cellophane wrappers and the placing of a sheet of grease proof paper between each layer of fruit.

The iodine wrappers were prepared in the laboratory and as in the previous preliminary trial were impregnated with a solution made from the formula given by Tomkins (3). Each wrapper contained approximately 0.0127 grammes of iodine. The wrappers were kept in air-tight containers until used. The " Shirlan " solution used was of 1 per cent. strength of " Shirlan HB."

The fruit for the whole of this trial was picked from the same grove in Famagusta under ordinary commercial conditions on 5th February and was transported directly after picking to the packing shed, there being no adequate provision for wilting in the groves.

The " Shirlan " treated fruit was dipped immediately after arrival at the packing shed, the time of immersion being approximately half a minute. It was then spread out in a layer two deep and after twenty-four hours the fruit had dried with little signs of any deposit. It was left *in situ* for a further six days for wilting.

The fruit for the rest of the trial was wilted for seven days and was graded, wrapped and cased on 11th February.

One portion of the trial was transported by rail to Nicosia and kept in store for a period of 25 days and was examined on 6th March—31 days after picking.

The consignment to Covent Garden Market was shipped on S.S. *Destro* on 13th February and arrived in London on 29th February. The fruit was examined in Messrs. Margetsons' warehouse the following day.

The following report was received on the condition of the fruit and the amount of wastage present :

" Little waste was found in the fruit wrapped with iodised wrappers, which produced no ill effect on the appearance and consistency of the fruit.

Wastage was heavy in the cellophane wrapped fruit. The cellophane caused excessive sweating and did not check contact wastage.

The ' Shirlan ' treated fruit showed the best results. It was reported that ' the sound oranges were of excellent appearance and it was impossible to detect by look or smell that they had been treated in any way. The wrappers were perfectly clean.'

The sheets of grease proof paper between the layers of fruit did not check contact wastage.

Consignment ex S.S. "Destro," March, **1936.**

Treatment	No of cases	Total No. of fruits	No. of waste	Percentage of waste
Iodised wrappers	20	2,991	117	3.91
'Shirlan'	5	702	27	3.84
Cellophane wrappers ..	14	2,282	342	15.00
Grease proof paper between layers	40	6,282	1,139	18.10

In this consignment no counts were made of any controls but the wastage on 477 cases was 40 cases or 8.37 per cent. Wastage of fruit from other consignments varied from 10 per cent. to 24 per cent.

The cellophane wrappers and grease proof paper appeared to have increased the amount of wastage.

The following figures were obtained on examination of the check consignment in Nicosia :—

Treatment	No. of cases	Total No. of fruit	No. of waste	Percentage of waste
'Shirlan'	8	1,021	25	2.4
Iodised wrappers	10	1,412	40	2.8
Cellophane wrappers ..	10	1,264	162	12.8
Control	10	1,372	106	7.6

It will be seen that these results agree closely with the figures obtained from the consignment to Covent Garden. The effect of grease proof paper between the layers of fruit was not tried in this consignment but the cellophane wrapped fruit showed an increase of wastage over the controls. The sound fruit in the cellophane wrappers presented a turgid and fresh appearance more attractive than any of the treated or control fruits. It appeared from the moist condition of the cellophane that excessive sweating was induced by this kind of wrapper and that conditions favourable to the development of waste were present."

Second Trial, 1935–1936 *Season.*

In view of the satisfactory report received of the "Shirlan" treatment and iodised wrappers it was decided to send a further and somewhat larger consignment of fruit with these two treatments to Covent Garden. It was anticipated that later in the season the amount of wastage would tend to increase and so provide a better test of the value of the treatment.

It will be seen below, however, that the wastage in the control was less than in the previous consignment. This may be accounted for by the fruit being mostly of the thin-skinned round varieties of the larger counts which under Cyprus conditions are not so liable to wastage as the thick-skinned oval types.

In this trial fruit was picked on 29th March, treated with "Shirlan" on 31st March, graded, wrapped and cased on 3rd and 4th April. The controls and iodised wrapped fruits were part of the same picking and were graded, wrapped and cased at the same time.

The " Shirlan " solution was a 1 per cent. " Shirlan " water soluble powder with .25 per cent. "Agral" added. About 100 fruits were dipped at a time in large wicker baskets and they were handled by workers wearing gloves. After draining the fruit was spread in layers two deep.

The iodised wrappers were impregnated with a slightly stronger solution than in the previous trial, each paper containing approximately 0.015 grammes of iodine.

The fruit was shipped on the S.S. *City of Lancaster* on 6th April and arrived in London on 22nd April.

The fruit was unloaded and examined on 27th and 29th April, with the following results :—

Treatment	No. of cases	Total No. of fruits	No. of waste	Percentage of waste
" Shirlan-Agral "	23	3,624	16	0.44
Iodised wrappers	10	1,478	9	0.61
Control	10	1,622	41	2.53

As a preliminary trial three cases of fruit were wrapped in cellophane wrappers coated with the same amount of iodine as the paper wrappers.

No wasted fruit was found in any of these cases. The report also stated that neither the "Shirlan" treatment nor the iodised wrappers affected the selling qualities of the fruit one way or the other.

A portion of the trial was as in the previous trial transported to Nicosia, kept in store and opened on 1st May, with the following results :—

Treatment	No. of cases	Total No. of fruits	No. of waste	Percentage of waste
" Shirlan-Agral "	5	778	3	0.38
Iodised wrappers	4	594	9	1.50
Control	5	774	32	4.10
Iodised Cellophane wrappers	—	80	—	—
Control	—	39	1	2.50

In both portions of this trial both "Shirlan" and iodine showed a reduction of wastage over the control and "Shirlan" again showed a superiority over iodine and a greater superiority than in the earlier trial. This may be accounted for by the better technique of dipping, involving less damage to the fruit, and the incorporation of a wetting agent with the dip.

The incorporation of a fungicide in cellophane wrappers seems worthy of further experiment.

From these trials it appears that until such times as refrigerated ships and precooling plants are available a form of " Shirlan " dip may be recommended to reduce the heavy losses at present occurring, especially in the early consignments when the whole voyage has to be made with closed hatches. Later in the season most of the voyage is made with

open hatches which doubtless accounts in part for the reduction of wastage in these consignments.

Acknowledgments and thanks are due to Messrs. N. P. Lanitis & Co., for allowing the trials to be carried out on oranges shipped by them and for giving every facility in connection with treatments and packing, to Mr. A. Panaretos for invaluable assistance throughout and to Mr. Butler, Chief Grader and Inspector of Produce, and his staff for arragements for stowage on board, and especially to the Secretary of the Cyprus Government Information Office in London, for submitting reports on the condition of the consignments on arrival.

(1) Bates, G. R., "Wastage during the 1932 Export Season." The British South Africa Coy., Mazoe Citrus Experimental Station. Publication No. 2, c. 1933.

(2) Nattrass, R. M., "Prevention of Wastage of Citrus Fruit in Transit." *Cyprus Agricultural Journal*, XXX, pp. 84–87, 1935.

(3) Tomkins, R. G., "Iodised Wraps for the Prevention of Rotting of Fruit." *J. Pomol.*, XII, 4, pp. 311–320, 1934.

Topping and Suckering of Vines.

TOPPING of the vine is carried out during the summer season and is often referred to as summer pruning of the vine. Topping is carried out by vinegrowers in Cyprus on a fairly extensive scale especially in Paphos District, but usually it is done in such a way that it is more detrimental to the vine than beneficial.

The object of topping is to strengthen the growth of the young shoots and make them more resistant to the effect of wind damage, it also provides shade to the grapes by the formation of extra leaves which protect the fruit from the hot sun. The practice of topping is done by removing a portion of the shoots at the tip by pinching with the thumb and finger or by using a knife. It is important that the operation is done at the right season. Some growers carry out the operation with a view to securing a second flowering as the first crop is usually damaged by Eudemis. It is desirable that this practice should cease and it is advisable that growers practise topping more judiciously and at the proper time. By topping at the time of opening of the blossom, *coulure* or dropping of the flowers may be prevented. If topping is done earlier, secondary or auxiliary shoots will develop to the detriment of the setting of the flowers, if done later, *coulure* will not be prevented but the development of the already formed berries will be assisted.

Topping is usually advantageous at the time of the commencement of flowering. Vines lacking in vigour or suffering from insufficient moisture should not be topped as the operation may weaken the vine. Vigorously growing vines or vines growing in moist soils benefit by topping. Excessive or too late topping is detrimental to the vine and the grapes owing to the period of growth of the vine being prolonged. Late topping also lowers the sugar content of the grape.

Suckering is the practice of removing all suckers or growth which appear around the stem of the vine. By the removal of the superfluous growth the development of the remainder of the vine is assisted and the vine becomes more vigorous and productive. Suckering should be done as often as necessary during the season.

Potato Trials.

THE following summary of a (1) Report on Potato variety trials 1934–35, published in the *Journal of the National Institute of Agricultural Botany*, is published for the information of readers of this Journal in view of the local custom of using ordinary large size ware potatoes for "seed."

Part I of the Report deals with the effect of size of "seed" on the yields of the larger grades of ware potatoes and it is stated that previous investigations have established a relationship between the size of seed potatoes and both the total yield and the proportion of "ware" produced. Within certain limits a large sett tends to produce a heavier yielding plant than a small sett but the crop produced by small seed is made up of larger tubers. The trial was carried out to examine the effect of size of seed on the yield of ware potatoes, and cut setts were included in the trial as evidence was available that the use of cut setts leads to an increase in the proportion of ware in the crop.

The trial was carried out on a light sandy loam with three grades of seed referred to as large, medium and small. At the time of planting a part of the large seed was cut into halves and another part into quarters, the cuts being made longitudinally and referred to as halved and quartered seed.

The classes of setts tested were :—

Large, with an average weight of ..	..	5 oz.
Medium ,, ,, ,, ..	..	2½ ,,
Small ,, ,, ,, ..	..	1½ ,,
Halved ,, ,, ,, ..	..	2½ ,,
Quartered ,, ,, ,, ..	..	1¼ ,,

The trial consisted of eight blocks, farmyard manure was applied at the rate of 16 to 18 tons per acre and at the time of planting the trial area received a dressing of 3 cwt. per acre of artificials containing equal parts of superphosphates, sulphate of potash and sulphate of ammonia. In the early stages the plants produced by the large setts appeared to be the most vigorous, owing to the production of a greater number of shoots; the growth of the plants from the quartered setts was irregular. At later stages no differences could be seen in the growth of any of the plots. The plots matured together and the produce was dressed over 1⅝", 1¾" and 2" riddles.

In summarizing the results the crop of ware potatoes produced by the five classes of "seed" were compared. The yield of ware was reduced in each case by increases in the size of riddle from 1⅝" to 1¾" and from 1¾" to 2".

Medium-sized whole tubers averaging 2½ oz. in weight, produced heavier yields of ware than any other setts of smaller or equal size, and this superiority was increased when the ware was dressed over larger riddles. Larger seed produced similar yields of 1⅝" and 1¾" ware to medium seed but was inferior to medium seed when a 2" riddle was used.

(1) "Potato Trials, 1934-35," B. Brandreth, B.A., *Journal of the National Institute of Agricultural Botany*, Vol. IV, No. 1, 1935.

Injurious Insects of Cyprus.

BY H. M. MORRIS, M.Sc., F.R.E.S., *Government Entomologist, Cyprus.*

[*Continued from March issue.*]

INJURIOUS INSECTS.

THYSANOURA:

Lepisma saccharina (Silver Fish, Fish Moth), occurs in houses and is destructive to paper, books and clothing.

ORTHOPTERA:

BLATTIDÆ (Cockroaches, "Black Beetles").

Blatta orientalis, L. and *Blatella germanica*, L., are common in houses, etc. *Periplaneta americana*, L., and *Polyphaga ægyptiaca*, L., also occur.

ACRIDIIDÆ:

Dociostaurus maroccanus, Thnb. (Moroccan Locust), is the most important locust and occurs abundantly. The area most seriously affected is the eastern end of the plain extending out to Cape Greco but they occur in all suitable parts of the plain extending westward to Morphou Bay. They also occur in the Karpas to the extreme end, in the area at the base of the Akrotiri Peninsula and westwards from Larnaca and Famagusta Bays. Small areas are also affected towards Cape Kormakiti and near the north coast.

This species breeds in hard uncultivated ground and the stoney ground thinly covered with a variety of plants in spring, such as occurs in patches throughout this area, is very suitable for it, these uncultivated patches occurring scattered amongst cultivated ground or in some areas being so extensive that the cultivated ground is in scattered patches amongst the uncultivated.

Oviposition occurs towards the end of May, the eggs hatching about the middle of the following March, hatching usually being 3 or 4 days earlier towards the eastern end of the plain than towards the western end.

A campaign is organized annually against this locust, a system of purchasing locusts which have been collected in hand nets being followed over the greater part of the area, poisoned bran bait being also used in some years since 1930 in some parts of the area affected.

Cereals are the principal crop affected by this species but the damage caused is usually small.

At the time of the British Occupation of Cyprus in 1878 very severe damage was caused annually by this locust and very extensive campaigns were necessary for some years until the numbers were considerably reduced, a system of screens and pits being employed. Spraying and poisoned bait were subsequently tried for a few years but were abandoned, and the collection of eggs was also carried out for a few years. The locust now occurs practically as a solitary grass hopper although very abundant in some areas. Hand collection commences soon after the hatching of the locusts and any tendency to form hopper swarms is soon broken up. The payment for the collection of the locusts is on the basis of the weight brought into the appointed purchasing places, and the price is reduced progressively with the growth of the insects and is maintained at a level such that an average labourer is able to earn a good days wage.

An account of this locust in Cyprus has been published by Stebbing (1).

Calliptamus italicus, L. (Italian Locust).—This locust occurs over much the same areas as *Dociostaurus maroccanus* but especially over the northern and western parts of the plain and to the north of the Akrotiri Peninsula, and it also occurs further west along this coast towards Paphos.

This species commences to hatch about three to four weeks later than *D. maroccanus*. towards the middle of April, and oviposition is correspondingly later.

This insect breeds in the edges of cultivated lands and especially in land which has gone out of cultivation for two or three years. Damage is sometimes caused to cotton seedlings.

This species is dealt with concurrently with *D. maroccanus*, being accepted for purchase at the same time.

Locusta migratoria, L. (ph. *solitaria*), (Migratory Locust).—The solitary form of this locust occurs. Conditions do not appear to be favourable for the development of the swarming phase and no damage by this species has been recorded.

Schistocerca gregaria. Forsk. (Desert Locust).—Invading swarms of this locust visited Cyprus in 1915, during the severe outbreak in Palestine and Egypt There were two distinct periods of invasion, the first in March and April, and the second in August. The first swarms oviposited in some cases but the hoppers were destroyed shortly after hatching. The August invaders did not oviposit. Some damage was caused by the March and April swarms to vegetables, but more serious damage was caused by those arriving in August, some of which remained in the Island until December, during which time they were almost continually on the move and damaged vines, olive trees and other crops.

This 1915 invasion appears to have been the only one since the British Occupation in 1878. A single living specimen of this species was taken at Asomatos in the Akrotiri Peninsula on 5th May, 1930. Careful search in this and other areas failed to reveal any further specimens. A vague report was received, some three weeks after the event, of a swarm of locusts having passed over or spent a night at Alekhtora, a village in Limassol District, about 13th March, 1930. No further information and no specimens could be obtained.

While it appears that an invasion of Cyprus by this locust is possible during its years of maximum abundance in Syria, Palestine and Egypt, with the improvement of control measures in those countries the possibility of such an occurrence becomes more remote.

Thisœcetrus littoralis, Charp.—Some old specimens of locusts dated 1912, handed over to the Agricultural Department when the charge of the locust campaign was taken over by that Department were partly this species, but there is no information as to whether this was actually the most abundant species in that year. It occurs fairly commonly as a solitary grasshopper.

Anacridium œgyptium, L., is sometimes sufficiently numerous to cause slight damage.

A number of other species of Acridiidæ also occur but are not of special importance from the point of view of damage to crops.

(1) Stebbing, W. P. D., "The Locust in Cyprus," *Ann. App. Biol.* IV, 3, 1917, pp. 119–122.

TETTIGONIIDÆ:

Tettigonia viridissima, L. (Green Grasshopper, " Vrouchos ").—This species causes a certain amount of damage occasionally, particularly to cotton and tobacco seedlings and also to broad beans. It is accepted for purchase with locusts during the locust campaign, but at a lower price owing to its larger size, when it is causing damage.

Decticus albifrons, Serv. (" *Skarnos* "), occurs similarly but usually in smaller numbers, and also *Metrioptera intermedia*, Serv.

GRYLLIDÆ:

Tridactylus variegatus, Latr., occurs fairly commonly and when present in numbers causes some damage to vegetables.

Liogryllus bimaculatus, Deg., has once or twice caused a certain amount of damage to vegetables

Gryllotalpa gryllotalpa, L. (Mole Cricket), is a widely distributed pest in gardens and fields and is particularly destructive in seed beds or amongst newly-planted seedlings. Its burrows just beneath the surface of the ground cause shallow-rooted seedlings to be killed by drying out, while it custs through the main root of larger plants. The damage done is probably accidental in most cases as it is probably in search of insect and other animal food and does not usually eat plant material; it is nevertheless a very troublesome pest.

DERMAPTERA:

FORFICULIDÆ:

Several species occur, including *Forficula auricularia* L., but no damage has been recorded.

ISOPTERA:

Termites occur fairly commonly but as they are species which live in dead tree stumps or rotting wood they are not usually of importance. The only records of damage are the occurrence of termites in a bookcase in the Nicosia Club, when a bookcase and two or three books were damaged, some damage to shelves and paper stocks in the Government Printing Office and a case where termites damaged a few vine cuttings planted at Athalassa.

ANOPLEURA:

MALLOPHAGA.—No records available.

SIPHUNCULATA.—No records available.

THYSANOPTERA.

Species belonging to this order are only of importance occasionally, probably when conditions have been especially suitable for them.

Thrips tabaci, Lind, caused damage to melon plants in 1931 and measures were necessary against it. This insect has not been recorded as injurious in other years.

Cryptothrips brevicollis, Bagnall, was described as a new species and recorded as causing injury to vines in 1915 (Solomides) (1). Damage by this insect has not been recorded during recent years.

(1). Solomides, Z. S., " Notes on a Thrips injurious to vines in Cyprus," *Bull. Ent. Res.*, VI, 1915, pp. 197-199.

HEMIPTERA:

PENTATOMIDÆ.—A number of species belonging to this family occur but only two or three are of any importance.

Dolycoris baccarum, L. (Stink Bug, "Vromousa") occurred in large numbers in 1927 in the cultivated areas of the higher villages in the southern mountains from about 1,500 or 2,000 feet to the highest at about 3,500 feet, and caused a good deal of damage to cereals and various vegetables, (potatoes, beans, peas) and to various fruits. There had apparently been small and unimportant attacks in previous years which had not been reported but the damage that year was considerably greater. In 1928 the occurrence and damage were about the same but in the following years there was a considerable diminution.

The insects appear in the villages at about the same date annually, usually between 15th and 20th May. They are spoken of by the villagers as arriving in swarms and it has also been reported that they fly in swarms when leaving the villages in June.

By the time they reach the cultivated fields the cereal crops are almost ripe, but some damage is caused to them at first before the grains become too hard. Later they attack beans, potatoes, peas, vines, etc. They also attack fruit to a certain extent, particularly cherries, which is the only kind of fruit ripe then in that area.

The insects appear to prefer to feed in groups on a plant rather than scattered more or less uniformly over the crop. Their presence on potatoes soon causes wilting of the plant on which they are feeding, particularly of the younger parts of the plant on which they chiefly feed, and which do not recover. When they feed on bean pods they cause a spotting of the seeds inside; when wheat is attacked they feed on the ear and cause the grains to shrivel.

The insects appear to have a single generation only as the damage continues only until the last few days of June, about 6 weeks from its commencement, and the insects then disappear from the fields and collect chiefly on *Chionistra* and other summits of Mount Olympus (6,400 feet) and also on other of the highest mountains in the Island. In these situations they are to be found in masses under loose stones throughout the remainder of the summer and under the snow in the winter. When the stones are moved the insects are very active in hot sunny weather, but do not readily take to flight.

These summits are sparsely covered with dwarfed pine trees and various bushes, but the more succulent plants on which the Pentatomids might be expected to feed are going over and dying down by the time the insects reach these places, and they do not appear to feed at all during the time they spend on these summits.

In places where, as on the summit of *Chionistra*, there are piles of loose rocks the Pentatomids occur in enormous numbers and their presence can be recognized by the smell.

Commencing in 1928 great numbers of the insects have been destroyed, chiefly on *Chionistra*, by means of "Cyanogas" dust. It has also been found that an average of about 50% are parasitised by Tachinid larvæ, and *Gymnosoma rotundatum*, L., and another species have been bred from them.

There have been some reports of damage by these insects in the autumn, but the numbers then occurring in cultivated fields have been small.

Eurydema festiva, L. and var. *pictum*, H.S.—This species and its variety occur fairly commonly and damage is sometimes caused, particularly to potatoes, in various parts of the Island.

Eurygaster integriceps, Put., appears to be widely distributed but only slight damage has been recorded by it on one or two occasions. This species is a serious pest, particularly of wheat, in Syria, Turkey and Iraq where its habits appear to be very similar to those of *Dolycoris baccarum* in Cyprus.

Stenozygum coloratum, Kl., occasionally causes damage to young shoots of citrus.

Nezara viridula, L., has caused slight damage once or twice to vegetables.

A number of other species of Pentatomidæ occur but have not been recorded as causing damage to crops.

CIMICIDÆ :

Cimex (species not determined) (Bed Bug). occurs commonly in houses.

COREIDÆ, CAPSIDÆ, etc.—Various species occur but no serious damage has been recorded.

LYGÆIDÆ :

Oxycarenus hyalinipennis, Costa., is often abundant but does not cause serious trouble.

Lygœus pandurus, F., is common everywhere but has not been recorded as causing damage.

TINGIDÆ :

Stephanitis pyri, F., occurs abundantly in most areas on apple and pear trees and also (probably the same species) on poplar, and causes a certain amount of damage, and sometimes complete defoliation.

Galeatus scrophicus, Saund., taken damaging chrysanthemums.

CICADIDÆ :

Cicada orni, L., is the commonest species and occurs abundantly in the summer, when the noise they make is almost deafening. A certain amount of unnoticed damage must be caused to roots of fruit and other trees by the nymphs, which live in the soil. *Cicadatra atra*, Ol., is also common and *Tibicen plebeja*, Scop., occurs less commonly.

JASSIDÆ :

(Identification not received). Occurring on almond trees at Saittas and apples at Trikoukkia, causing curling of leaves and stunting of shoots.

PSYLLIDÆ :

Euphyllura olivina, Costa., occurs fairly commonly on olive trees but is not of great importance.

ALEYRODIDÆ :

Aleurolobus olivinus, Silvestri, is widely distributed on olive trees but unimportant.

Aleurotrachelous cyprusi, Dozier, occurs on pomegranates but is unimportant.

APHIDIDÆ.

Aphis rumicis, L. (Black Aphis, " Psora ").—This species is a serious pest of broad beans but the incidence of the attack varies considerably from year to year. In bad years it may cause complete loss of crop in badly affected fields.

Aphis gossypii, Glov., occurs very commonly on cotton and melon plants and sometimes causes serious damage.

Doralis punicæ, Pass., is recorded on pomegranate.

Doralis pomi, Deg., recorded on apple.

Dentatus roseus, Baker, also recorded on apple but neither species is usually abundant.

Toxoptera aurantiæ, B.d.F., fairly common on citrus trees.

Lachnus persicæ, Burn., is fairly common on the trunk and branches of almond, peach and plum trees.

Brevicoryne brassicæ, L., common on cabbages, cauliflowers and other cruciferous plants.

Chromaphis juglandis, Goetze, occurs on walnut trees.

Hyalopterus arundinis, F., frequently causes a considerable amount of leaf curl on almond and peach trees.

Eriosoma lanigerum (Hausm) (" Woolly Aphis "), occurs fairly commonly on the comparatively small number of apple trees growing in the lower parts of Cyprus, but is of small importance there. It also occurs in some of the higher areas where apples are an important crop, but the damage caused by it is not of serious importance.

COCCIDÆ :

Many species of scale insects occur on wild and cultivated plants, of which the following are the most important :—

Chrysomphalus aurantii, Mask. (Red Scale).—This species occurs very commonly on citrus trees, especially lemons, and in cases of heavy infestation causes defoliation. Carob, mulberry, rose and other plants are also attacked. This is the most important citrus pest in the Island and a certain amount of spraying and fumigation are carried out against it.

Aspidiotus hederæ, Vallot (White Scale), is very common and widely distributed, occurring on a large variety of host plants. It occurs in great abundance on carobs in some areas but otherwise its attacks are not of great importance, although plantations of Wattle (*Acacia sp.*) are often heavily attacked. This species has been recorded (1) as occurring on lemons imported into Egypt from Cyprus, but search of citrus plantations in Cyprus had failed to reveal this scale on citrus, even in localities where the citrus plantations adjoin wattle which is heavily attacked by it. It is recorded as attacking lemon trees in Italy and France.

Aspidiotus lataniæ, Sign. (*cydoniæ*, Comst.)—This scale has been recorded (1) on citrus fruit from Cyprus on arrival in Egypt, but as a result of search in Cyprus it has been stated to occur in small numbers only and to be of little importance.

(1) Hall, W. J., " The Insect Pests of Citrus Trees in Egypt." Ministry of Agriculture, Egypt, *Tech. and Science Service Bulletin* No. 45.

Aspidiotus britannicus, Newst.—Recorded on carob, but unimportant. The absence of *Chrysomphalus aonidum*, L., and *C. dictyospermi*, Morg., is worthy of note, and it is to be hoped that it will be possible to prevent their being introduced.

Ceroplastes rusci, L.—Very abundant on fig trees in several areas and causes some damage. It has also occurred on orange trees in one or two localities, the sooty mould which accompanies it causing discolouration of the leaves and fruit. It occurs commonly on oleander and *Cratagus azarolus*.

Ceroplastes floridensis, Comst., and *Icerya purchasi*, Mask., were introduced on citrus seedlings from Palestine in 1934 but efforts which have been made to eradicate them appear to have been successful and they may be completely eradicated.

Lecanium elongatum, Sign., occurs occasionally on carob but is unimportant.

Lecanium hesperidum, L.—This species occurs commonly on citrus but seldom in sufficient quantity to be of much importance.

Lecanium persicæ, Geoff., has been recorded on mulberry but is unimportant.

Lecanium (Saissetia) oleæ, Bern., occurs on olive and quince but is not abundant. This species has only occasionally been recorded on citrus in Cyprus although it is recorded as a serious pest in French North Africa (1).

Chionaspis striata, Newst, occurs on Thuja and Cypress.

Lepidosaphes ulmi, L.—Common on Carob.

Lepidosaphes beckii, Newm. (Mussel Scale).—Citrus trees in a small area including Limassol town were found in 1934 to be heavily infected with this scale. Extensive fumigation has been carried out since with a view to preventing its spreading to other areas.

Lepidosaphes conchiformis, Gmel., occurs on pomegranate.

Lepidosaphes ficus var. *nicosiæ*, Green, occurs on fig.

Leucaspis knemion, Hoke, recorded on *Pinus pinea.*

Leucaspis pusilla, Loew., recorded on *Pinus canariensis.*

Leucodiaspis riccæ, T.T.—This species occurs widely on olive leaves and fruit, sometimes in great abundance. Its presence on the fruit causes a dark patch.

Parlatoria oleæ, Colv., occurs commonly on fruit trees, (apple peach, loquat, etc.).

Parlatoria zizyphi, Lucas.—Stated (2) to occur on fruit, especially on lemons, imported into Egypt from Cyprus, but not otherwise recorded.

Parlatoria pergandii, Comst.—Stated (2) to occur in Cyprus; also recorded on apple.

Pollinia pollini, Costa., occurs commonly on olive trees.

Targionia vitis, Sign.—Common on vine.

Pseudococcus citri, Risso, (Mealy Bug.), occurs fairly commonly on various plants, including citrus trees, but not usually in any great numbers.

(1) Freeborn, S. B., "Citrus Scale Distribution in the Mediterranean Basin." *Journ. Econ. Ent.*, XXIV, No. 5, 1931, pp. 1025-1031.

(2) Hall, W. J., "The Insect Pests of Citrus Trees in Egypt." Ministry of Agriculture, Egypt, *Tech. and Science Service Bulletin* No. 45.

[*To be continued in September issue.*]

EDITORIAL AND ADVERTISEMENT NOTICES

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

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The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

The Horse Breeding Law, 1930.

LIST OF STALLIONS LICENSED FOR 1936.

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ROBERT J. ROE,
Chief Veterinary Officer,
Inspector of Horse Breeding.

30th June, 1936.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

MARCH, 1936.

District and Station	Shade temperature Mean Maxim	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fall
Nicosia District :							
Nicosia	69.36	44.81	0.74	6	0.29	0.76	-
Athalassa			0.82	7	0.27	0.93	
Morphou		-	-			0.59	
Makhæras		–			-	1.75	—
Famagusta District.							
Famagusta	71.58	46.87	0.49	3	0.40	0.82	-
Akhyriton	67.90	44.00	0.45	3	0.27	0.89	
Rizokarpaso ...			0.68	2	0.40	1.34	–
Lefkoniko			1.72	4	0.86	0.91	-
Larnaca District.							
Larnaca	71.00	44.00	1.26	6	0.48	0.95	-
Lefkara			1.03	4	0.40	1.15	
Limassol District :							
Limassol	69.87	45.55	0.85	5	0.51	1.14	- -
Saittas			1.13	6	0.76	1.75	–
Trikoukkia	53.87	37.48	1.60	4	1.10	3.09	
Alekhtora			1.70	5	0.60	1.14	–
Paphos District							
Paphos . .		-	1.90	2	1.65	1.40	
Polis			1.43	5	0.95	1.49	
Kyrenia District							
Kyrenia	66.17	48.19	1.04	5	0.47	1.25	

APRIL, 1936.

District and Station	Shade temperature Mean Maxim	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fall
Nicosia District							
Nicosia	74.77	52.50	1.06	3	0.68	0.63	
Athalassa	-		1.07	4	0.44	0.85	
Morphou	88.33	49.00	0.13	1	0.13	0.48	
Makhæras					-	0.74	-
Famagusta District :							
Famagusta ..	77.77	53.43	0.47	3	0.25	0.59	-
Akhyritou	75.00	52.10	0.79	5	0.37	0.60	
Rizokarpaso ...		—	1.31	5	0.70	0.68	
Lefkoniko			2.04	5	1.55	1.11	-
Larnaca District :							
Larnaca	76.00	52.00	1.07	5	0.47	0.81	–
Lefkara	-	-	3.15	2	3.10	0.89	—
Limassol District :							
Limassol	75.13	52.07	0.83	6	0.50	0.72	-
Saittas	—		0.50	6	0.20	1.02	-
Trikoukkia	60.52	45.00	1.08	4	0.50	1.81	
Alekhtora	—		0.33	2	0.26	0.93	—
Paphos District :							
Paphos	-	—	1.32	4	0.70	0.83	
Polis...	—	- -	0.50	1	0.50	0.55	–
Kyrenia District :							
Kyrenia	71.20	54.40	0.15	4	0.04	0.84	–

***Note.*—Compiled from returns furnished by Public Works Department**

MAY, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fell
Nicosia District:							
Nicosia	80.97	56.65	3.01	8	0.88	0.74	—
Athalassa	—	—	3.58	6	1.50	0 61	—
Morphou	88.64	54 48	2 55	5	0.90	0 33	—
Makhæras	—	—		—		0.54	—
Famagusta District:							
Famagusta	82 46	59 23	1 52	6	0.74	0.28	—
Akhyritou	79.80	56 70	2 43	6	0.92	0.26	—
Rizokarpaso ...	—	—	0.62	3	0.36	0.61	
Lefkoniko	—	—	3.13	7	1.85	0.96	—
Larnaca District:							
Larnaca	82.00	56.00	0.50	5	0.15	0.21	—
Lefkara	—		2 06	6	0.64	0.35	—
Limassol District:							
Limassol	78 84	57 39	1.15	6	0.42	0.25	—
Saittas		—	4 85	9	1.60	0 80	
Trikoukkia... ...	—		4.65	8	1.32	1.28	—
Alekhtora	—	—	1.22	3	0 70	0.48	
Paphos District:							
Paphos			1.15	8	0 30	0 48	—
Polis...	—	—	0.65	4	0.42	0.49	—
Kyrenia District:							
Kyrenia	75 25	58 17	1.60	7	0 49	0.58	—

Note.—Compiled from returns furnished by Public Works Department.

Department of Agriculture, Cyprus.

HEADQUARTERS—NICOSIA.

ALL general correspondence should be addressed to the Director of Agriculture.

Correspondence and applications for advice referring to the Veterinary, Entomological, Mycological or Chemical Branches, should be addressed to the Officer in charge of the Branch. When seeking advice in regard to treatment of plant pests or diseases, specimens should, whenever possible, be sent.

GOVERNMENT STOCK FARM, ATHALASSA AND DISTRICT STUD STABLES.

Applications for services of stud animals at Athalassa or the supply of live stock, poultry, eggs, etc., should be addressed to the Manager, Stock Farm, Athalassa. Applications for services of stud animals at District Stud Stables should be made to the Stud Groom in charge. There are Stud Stables at Famagusta, Vatili, Rizokarpaso, Ayios Theodhoros, Lefkoniko, Larnaca, Limassol, Paphos and Polis.

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The
Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

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EDITORIAL NOTES

AGRICULTURAL SITUATION.

WEATHER conditions have continued somewhat abnormal throughout the past three months with occasional rain. In consequence fungus diseases have been prevalent, particularly on vines and there has been some further damage to cereals on the threshing-floors. Prices of agricultural produce have been satisfactory. Wheat has been much in demand and prices have risen in sympathy with the general rise in world prices. Deciduous fruits have realized high prices both locally and for export and the apple crop has been of much better quality than ever before owing to more general spraying for the prevention of Codlin Moth attack. Cotton is late this year and it is expected that losses from Boll Worm attack will be considerable. Live-stock has remained in good condition but grazing is becoming scarce. Carob production has been poor in parts but the quality is good and prices have been satisfactory. A medium citrus crop is expected and early purchases have been made at 25*s.* per 1,000 for oranges and 18*s.* for lemons. Common grapes are being exported to Egypt in considerable quantities and there have been several requests for improved varieties of table grapes. When these are available in larger quantities it is confidently expected that a valuable trade can be built up.

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Buyers representing the Greek Government have purchased during the past few weeks over 500 tons of seed wheat of the varieties Kyperounda, Psathas, Tripolitiko and Akanthiotiko. While the quality of seed wheat available was not so good as in the previous year owing to rust attacks and bad weather at harvest time, the buyers report that there has been a marked progressive improvement in the type and quality of seed wheat offered during the past seven years.

Complaints are still made of the large admixture of dirt in the seed wheat and the best sample in type and quality offered was refused owing to the large proportion of foreign matter it contained.

There is a good demand for barley of good quality and in good condition from the United Kingdom.

A considerable demand for selected wheat seed from the Central Experimental Farm at Morphou has arisen and all available seed has

already been sold. Farmers are increasingly realizing the importance of the use of selected wheat seed and it is hoped that this demand will rapidly extend in the case of other crops.

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VINE GROWING.

Discontent among vine growers in the main producing areas at the prices offered for their produce and the difficulty met with in selling it, led to the calling of two largely attended meetings of growers, the latter of which submitted a series of resolutions to Government. The main reasons for the vine growers' difficulties are the contraction of the market for wines in Egypt and the loss of the German market for raisins. The main demand of the growers is the revocation of Law 25 of 1928, and permission for uncontrolled or less strictly controlled export of wines to the United Kingdom. It is abundantly clear to any one with a knowledge of the wine market in the United Kingdom that uncontrolled marketing would be likely to result in the partial loss of such export to the United Kingdom as now takes place. The method in force of permitting export under licence only and confining licences mainly to the only firm which has up-to-date and efficient wine-making plants and facilities to hold stocks has resulted in securing a market in the United Kingdom for about a quarter of a million gallons of wine and 500 tons of must annually in the face of strong competition from better quality wines of Empire origin. While it may be felt that the United Kingdom market may and should be further developed, any development will be achieved by more organization and control of marketing and not by permitting unorganized shipments of different types and qualities of wine to be sent. Government has been giving the matter much consideration and attention as a result of which it is hoped that this market may be expanded in the immediate future.

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COTTON.

Late spring rains resulted in cotton planting being later than normal and attack by Pink and Spiny Boll worm is heavy especially on rain grown cotton. Later pickings will be very poor. Apart from the attacks of insects the quality of Cyprus cotton is much reduced by the use of mixed seed and by improper methods of picking. The Agricultural Department is taking steps to provide pure seed for use in the most important cotton-growing area in 1937, but results will not be satisfactory unless planting is early and the cotton is properly picked. A large majority of growers cling to the method, non-existent outside Cyprus, of snapping off the whole boll in the field, storing under dirty conditions in the houses and picking the seed cotton out of the dry boll in winter. In consequence bits of stalk and leaf remain in the cotton together with much dust and the value is naturally reduced. Ginning is mainly done by "Saw" gins which again reduce the quality of the lint. Cyprus has been able to market this inferior cotton satisfactorily in Greece up to the present but that market is being gradually and certainly lost and there is little hope of successfully entering a new market until the quality is improved. Properly prepared Cyprus cotton is well reported on in England and could readily be marketed there at satisfactory prices.

CYPRUS SHIPPERS' ASSOCIATION.

The second meeting of the Council of the Cyprus Shippers' Association was held on 5th August. The main subjects discussed were the position with regard to the balance of trade between Roumania and Cyprus; Roumanian and German debts; the establishment of a Monthly Cyprus Import and Export Gazette for the Association and the relationship between the Association and the newly-formed Citrus Shippers' Association. It was decided to invite the Committee of the latter Association to meet the Council and discuss the position. The Citrus Shippers' Association were, however, unwilling to meet the Council. Later a meeting was arranged on 18th August which representatives of the Citrus Shippers' Association promised to attend but they did not appear at the meeting.

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CO-OPERATIVE MARKETING.

The Kakopetria Apple Growers' Co-operative Association experienced a most successful season and secured excellent prices for their crop. Encouraged by this example steps have been taken to form a similar organization at Perapedhi.

For the same reason and in view of the formation of the Citrus Shippers' Association, which it was believed intended to agree to offer a lower price for citrus than in past seasons, Co-operative Marketing Associations are in process of formation among the Famagusta Orange Growers, the Karavas Lemon Growers and the Morphou Orange Growers.

Co-operative selling Associations are in process of formation also at Stroumbi, Polemi and Kathikas for the sale of grapes in Egypt. The three Societies are working in union. After considerable difficulties in the case of the first few shipments it is believed that satisfactory arrangements have now been made for marketing and shipping. Growers have been promised not less than 1*cp.* per oke for ordinary grapes and a market for some 800 *kafizas* a day has been secured.

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AGRICULTURAL SHOWS.

The following Agricultural Shows have taken place during the past three months.

On 17th July, Potato Show at Akhna. Excellent exhibits of potatoes were on view and dances and poems in honour of the potato were given. A medal was presented to Mr. Hambis Mouscovias who first introduced potato growing into Akhna.

On 29th and 30th August the first Pitsillia Show was held at Agros. Very creditable exhibits of fruits and wines were shown.

On 4th to 6th September an Agricultural and Industrial Show was held at Limassol. Industrial and manufacturing exhibits were prominent and some of the larger firms had most tastefully arranged pavilions to exhibit their products. Wines, brandies, tiles, machinery, were practically noteworthy. The Show was honoured with a visit by His Excellency the Acting Governor and the Rt. Hon. Sir Samuel Hoare, First Lord of the Admiralty, who were much impressed with the exhibits.

On 8th September the Agricultural and Animal Show at Lysi was held. This Show was not so well supported as in 1935, but some excellent live-stock was on view and particularly good exhibits of barley were seen.

MYCOLOGICAL NOTES.

Seed Corn Treatment.

It is expected that a greater amount of seed will be treated this year than in past years, owing to the good results obtained by the farmers who treated their wheat and barley seed last year.

The Agricultural Club of Xeri village has arranged to treat over 700 kilés of seed corn for its members. It is hoped that the good example of this progressive Agricultural Club will be followed by other agricultural societies for the benefit of the farmers, in view of the great losses caused every year by the Smut diseases of cereals, which can be prevented by a simple seed treatment.

Tomato Disease.

A fungus disease (*Oidiopsis*) has caused a great amount of damage to the tomato crop throughout the Island as in previous years. Demonstrational spraying carried out at Kythrea, Louroujina and Paleometokho gave very satisfactory results for the control of this disease.

Severe damage to tomatoes was also caused by mites, which were successfully controlled by dusting with sulphur.

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VETERINARY AND LIVE-STOCK NOTES.

A considerable amount of damage was caused by late rains to the grazing in many parts of the Colony. Stubbles and dry natural pastures, which would otherwise have provided plenty of food for the flocks until the winter, became sodden and rotten, and there is likely to be a shortage of grazing unless the autumn rains are early and frequent.

Flock owners are advised to provide supplementary feed—ground oats or barley with vetch straw—during the next couple of months, especially to pregnant ewes, and to drench all flocks every three or four weeks with copper sulphate solution which is obtainable free of charge from the Veterinary Service.

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The number of sheep in the Colony is the highest for fifty years and the number of goats is the highest since 1911 while the extent of grazing area is becoming less each year. Unless, therefore, supplementary feeding and other improved methods of flock management are generally adopted, heavy losses are likely to occur in adverse conditions of climate or if pasture becomes further depleted.

The general condition of flocks at present is very good and forage supplies for large animals and for hand-feeding flocks are plentiful.

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In the 1936 Anthrax campaign over 730,000 sheep and goats were vaccinated during a period of ten weeks in April-June. The vaccine appears to have given complete protection to sheep but some outbreaks of anthrax in goats have been reported in areas known to be heavily infected and in which proper attention is not being paid to the all-important necessity of burying carcasses.

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The following live-stock has been purchased for the Government Stock Farm and is expected to arrive in Cyprus early in October: One Irish Draught stallion, one Dale Pony stallion, one Kerry bull, one Shorthorn bull and four Shorthorn heifers and a number of Rhode Island Red and White Leghorn poultry.

Citrus Fruit Wastage.

BY DR. R. G. TOMKINS

(Department of Industrial and Scientific Research, London).

[*Reprinted from the Monthly Journal "Hadar," April,* 1936.]

Memorandum presented at a meeting of the Citrus Fruit Committee on the 26th of March, 1936.

WASTAGE.

LOSSES in Jaffa oranges sent to the English markets are chiefly due to rots caused by green mould.

Three conditions are essential for the occurrence of rots :—

(1) Spores must be present on the fruit.

(2) The fruit must be liable or susceptible to attack by the fungus.

(3) The conditions of storage must be suitable for the development of rot.

The extent of rotting experienced in any instance is determined by all three conditions, though in certain instances it is possible to attribute the losses more particularly to one of the conditions.

THE EFFECT OF THE NUMBER OF SPORES PRESENT.

If no spores are present, no rotting occurs, whatever may be the conditions of transport.

The greater the number of spores present, the greater the risk of rotting. For example, sample boxes of South African oranges were dusted with green mould spores. Waste was thereby increased from 2 to 30%.

Spores get on to the oranges chiefly in the picking shed. If any of the oranges in the wilting piles become mouldy, the spores are transferred to the surrounding oranges. Spores get into orchard boxes and into brushing machines. Spores settle from the air of the pack-house. If managers of pack-houses take care that no mouldy fruits get into the pack-house, that orchard boxes and grading machines are clean, the chances of losses from green mould are largely reduced. If they do not, they are bound to suffer losses. Excessive losses should in the first instance be blamed on the packer for allowing spores to get on to the fruit.

THE EFFECT OF SUSCEPTIBILITY TO INVASION.

Absolutely sound fruit is considered not liable to attack. If oranges are mechanically damaged, *i.e.* scratched with nails, or damaged by grit or stung by flies, while spores are present, rotting follows. That is why damaged oranges are removed in grading.

It is also important to prevent damage to oranges after packing. Damage can be caused by rough handling of boxes and by bumping, which in its turn may be caused by driving loaded lorries at excessive speeds over bad roads.

Seemingly sound oranges may bear minute wounds and be open to attack by fungi, if spores are present. It is quite well known that Jaffa oranges picked toward the end of the season are more liable to attack than oranges picked earlier in the season. It is difficult, but not impossible, to measure exactly how liable to attack any sample of oranges may be. For this reason it is difficult, but not impossible, to say exactly to what extent chemical manure, type of stock, age of tree, weather conditions, or wilting influence liability to rot. All of these factors have some influence on the liability to waste, but not as much as is often supposed.

EFFECT OF CONDITIONS OF TRANSPORT.

If oranges are wounded and spores are placed on the wound, rots develop. Development takes time because the soft rotten condition follows the development of the fungus in the tissues. The number of days, in which rot reveals itself depends chiefly on the temperature.

The minimum time for development at various temperatures is as follows :—

5°C	30 days	20°C	3 days
10°C	10 ,,	25°C	3 ,,
15°C	6 ,,		

Of course, when the wounds are small the rot may take longer to develop. If one is considering large samples it is best to ask how long it will take for 10% of the sample to rot. For 10% of the fruit to rot it will not take the minimum times given above, but 3–4 or 5–6 times as many days. It is certain that the longer samples of oranges are kept, the greater will be the number of rotten fruits. Therefore, they should be sent to the market as soon after packing as possible. The amount of waste experienced is, for similar samples, roughly proportional to the days taken to arrive in England, *i.e.* the sum of the days :—

(1) Between packing and loading onto the ship.

(2) Between loading onto the ship and the time of sailing.

(3) Between leaving Palestine and reaching England.

(4) Between discharge and selling.

There are often grave delays, between picking and loading due to :—

(1) Lack of transport.

(2) Difficulty of making up consignments.

There are often delays of ten days between loading and sailing due to :—

(1) Lack of supplies.

(2) Storms delaying loading.

The time taken up to make the voyage depends on the speed of the ship and weather conditions.

All delays, whatever the cause, contribute equally to increase waste.

The lack of ventilation on ships is often said to be the chief cause of excessive waste. There is said to be evidence that carriage in certain ships always results in excessive waste. Such statements should be accepted with caution,

Ventilation is practised :—

(1) to remove the heat produced by the oranges.

(2) to remove the Carbon Dioxide produced.

(3) to remove the volatile products.

(4) to reduce the humidity of the atmosphere.

The advantage of removing the heat is obvious. To do this the air introduced must be below the temperature of the fruit and this may not always be the case.

Ventilation removes the Carbon Dioxide and volatile products, but it is not known whether their presence has any effect on the extent of rotting.

Ventilation may reduce the humidity of the air in the hold, but again it is doubtful how far this may influence rotting.

It is, therefore, impossible to be certain how far ventilation as practised on ships, influences the extent of waste. Ventilation as such is not important, its value lies in the extent to which it prevents increase of temperature and accumulation of Carbon Dioxide, volatile vapours. Temperature conditions, the amount of Carbon Dioxide present and the relative humidity could all be measured, but ships are not fitted with the appropriate equipment. Therefore, for the present, the real effect of ventilation is not known, and is a matter of surmise and opinion only.

To summarize : If waste is reported in a consignment of oranges arriving in England do not rashly assume that one factor alone has been the case, but try to apportion the blame more evenly between :—

(*a*) the spores, the packer allowed to get on the fruit ;

(*b*) the presence of damaged oranges, which should not have been packed ;

(*c*) the damage inflicted by a drive at excessive speeds over rough roads ;

(*d*) the delay caused by waiting for a " good " ship, instead of loading seven days earlier onto a " bad " ship ;

(*e*) the delays caused by storms at Jaffa ;
(Shippers can partly overcome all these causes ; even storms at Jaffa can be avoided by shipping through Haifa.)

(*f*) the unknown conditions to which the fruit is subjected on the ship, and which the chief engineer controls to the best of his ability.

Ceratitis capitata, Wied.

MEDITERRANEAN FRUIT FLY.

BY H. M. MORRIS, *Government Entomologist.*

THIS insect is a serious pest of many kinds of fruit throughout the Mediterranean region and also in South Africa, Australia and other countries, where its attacks continue throughout the year on the various kinds of fruits as they ripen.

The adult fly is a little smaller than the common house fly and is chiefly yellow in colour with brown, black and white markings. The head is yellow, and while it is alive the eyes are emerald green. The back of the thoracic region is shining black with white markings while the abdominal region is yellowish with two transverse white bands.

The wings are very characteristic and when the fly is at rest they are held in a half closed position and rather below the back, instead of closed and above the back as with most flies. The wings are also very characteristically marked with a transverse band of yellowish and greyish colour, a longitudinal band of similar colours near the fore edge, and another patch of rather paler colour near the end, and they also bear a number of blackish markings near the base.

The adult flies live about four to eight weeks or longer and the females lay 300 to 400 eggs, or even more, laying about 20 eggs a day. These eggs are white and elongated and are about one-twenty-fifth of an inch (1 mm.) in length, so that they are not easily seen in the fruits. The eggs are laid below the skin of fruits, usually in groups of 2 to 6, and the larvæ on hatching from the eggs burrow and feed in the flesh of the fruit until they are full grown. Many of the attacked fruits fall to the ground (most of the attacked fruits in the case of oranges). When the larvæ are full grown they leave the fruit and enter the ground where they pupate, usually just below the surface. In due course the adults emerge from the soil and again attack any fruits which may be suitable. Under favourable conditions in summer the life cycle may be completed in about 3 weeks, but in winter it may require 3 months. The number of generations in a year varies a great deal according to the climatic conditions, but in the coastal regions of Cyprus there are probably 6 or 8 generations.

The full-grown larvæ are active white maggots about five-sixteenths of an inch (7 to 8 mms.) in length and the pupæ are brownish and about three-sixteenths of an inch (5 mms.) in length.

A very large variety of fruits and vegetables may be attacked under suitable conditions but the fruits chiefly preferred are peaches, pears, mandarines and thin-skinned oranges. Figs, grapefruit, prickly pears, quinces and mulberries are also readily attacked, while even broad beans, cucumbers and carob pods may be attacked.

In order to lay their eggs the flies pierce the skin of the fruit, and the eggs are then laid below the skin. The puncturing of the skin in this way causes a small discoloured patch to appear on most kinds of fruit, thus giving an early indication that the fruit is attacked. In later stages of the attack much of the interior of the fruit may be destroyed, and the damage due to the larvæ is greatly increased by fungi and bacteria which obtain admission through the oviposition puncture and eventually cause the complete decay of the fruit.

When citrus fruits are attacked early in the season a large proportion of the eggs do not hatch, or if they do hatch the larvæ fail to develop, owing to the presence of oils in the skin of the fruit. In ripe citrus fruit the attack develops normally and is often severe. Although the larvæ do not develop in the unripe fruit the oviposition punctures nevertheless enable fungi and bacteria to enter and cause rotting.

CONTROL MEASURES.

Destruction of Fallen Fruit.

Owing to the larvæ living buried in fruits no direct measures are possible against them except by the destruction of attacked fruits. As most fruits when attacked by the larvæ fall to the ground before the development of the larvæ is completed, the destruction of such fallen fruit is a valuable means of preventing the development of the larvæ and the increase of subsequent generations of the flies, but as the larvæ may leave the fruit soon after it falls to the ground it is necessary that the collection and destruction of fallen fruit should be carried out daily. Instead of destroying fallen fruit it may be used for juice extraction but the pulp remaining from this process should be destroyed in the same way. Fallen fruit or pulp should be destroyed by placing it in a hole in the ground, covering it with a layer of lime and then filling the hole with soil, which should be well trodden down, so that there is at least a foot of soil above the fruit.

This collection and destruction of fallen fruit should be done for all the usual fruits which are attacked, but in the case of oranges, owing to the larvæ failing to develop in unripe fruit, it is not necessary before about 1st December.

Avoidance of Alternative Host Plants.

It is seen from the account which has been given of the life cycle that the insect requires fruit in a suitable condition for its attacks all through the year, attacking the various kinds of fruit as they become ripe. If, therefore, there is a sufficiently long period during which there is no fruit available for attack the flies will die out without breeding. It is, however, very difficult to attain to this condition owing to the very wide range of fruits and vegetables in which the fly could breed, if necessary, and also owing to the relatively long life of the flies.

Traps.

This method depends upon the attraction of the flies to certain substances which are used as baits in traps. The traps may be of various types, the most convenient being a glass globe with a somewhat conical entrance below, the bait being put in and removed by a hole at the top which can be closed by a cork. These traps are easily hung in the fruit trees by means of a string or wire, being hung in a sunny place during the cooler months and in the shade or half shade of the leaves during the hot weather. It is necessary for the bait to be renewed fairly frequently as it spoils or dries up, once a week being sufficient in cool weather but more frequent attention being necessary in the summer.

A number of different materials or mixtures may be used in such traps; one of the most effective and convenient being a proprietory material known as "Clensel" which for use is diluted with water at the rate of one part of "Clensel" to 30 parts of water.

Water in which bran has been soaked is also a good bait, borax being usually added in addition to delay excessive fermentation. The proportions used are as follows : bran 20 drams ; borax 20 drams ; water 1 oke. This mixture may be put in the traps or the bran and water may be allowed to stand about two days, until a smell of fermentation is given by the mixture, when the water is poured off and used in the traps and the bran is discarded.

If desired these baits may be used in open jars or pans, in which case two drams of sodium arsenite should be dissolved in each oke of water, but the use of this poisoned bait has the disadvantage that it entails the use and exposure of considerable amounts of poisonous material.

Another useful bait is prepared by boiling dried figs in water for half an hour, at the rate of 1 oke of dried figs to 10 okes of water.

Various other materials may be used as baits but those given above are the most convenient and satisfactory.

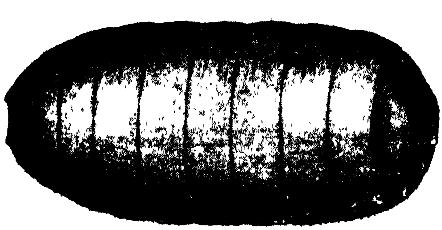
The number of traps used is of great importance as the distance from which flies are attracted to the traps is small. For large apricot or similar trees two or three traps should be used in each tree, and for large citrus trees there should be one trap in each tree if possible.

The dates from which the traps should be hung in various kinds of fruit trees are as follows :—

(*a*) For loquat trees from 1st February.
(*b*) For apple, apricot, black mulberry, **caisha**, cherry, medlar, peach, pear or plum trees from 1st May.
(*c*) For fig or pomegranate trees from 1st July.
(*d*) For citron, grapefruit, lemon, lime, mandarine, orange or quince trees from 1st August.

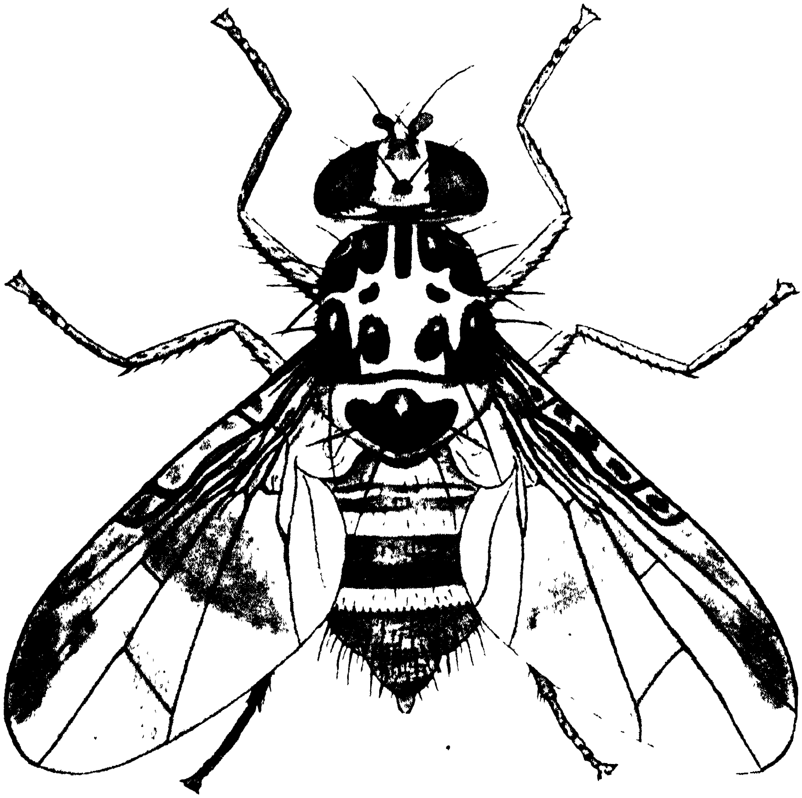
Bait Spraying.

This method consists of spraying or sprinkling on to the fruit trees a small amount of a substance which is attractive to the flies but which also contains poison so that the flies feeding on it are killed. This bait spray is not sprayed in the same way as ordinary sprays but only a small amount is used, about 30 to 100 drams per tree according to the size of the tree.

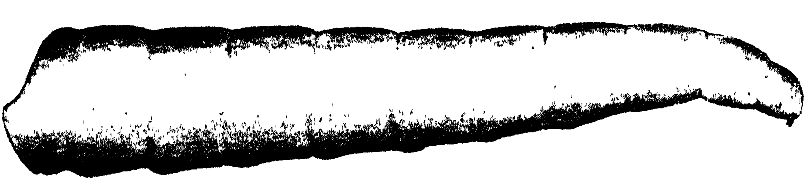


Pupa of the Mediterranean Fruit Fly.

(The small figure indicates the actual size.)



The Mediterranean Fruit Fly (*Ceratitis capitata*).
(*The small figure indicates the actual size.*)



Larva of the Mediterranean Fruit Fly.
(*The small figure indicates the actual size.*)

The bait spray is applied about every 8 or 10 days as required, or renewed more often if it is washed off by rain, and the application of the bait is commenced about the same dates as those given in the previous paragraph for the various kinds of fruit, and the applications are continued until all fruit is removed from the trees. The bait is sprayed lightly on to the leaves, chiefly on the upper part of the tree and on the sunny side, the fruit being avoided as much as possible. All trees bearing fruit should be treated from the dates given, and also any other trees near in which the flies may shelter.

The most satisfactory bait to use is prepared in the following proportions : 1 oke sodium fluosilicate, 30 okes white sugar and 600 okes of water.

Other mixtures may also be used but the one given is probably the most convenient and satisfactory.

General Recommendations.

The most satisfactory control of *Ceratitis* will probably be obtained by a combination of the measures described above.

Bait spray should be applied during the period indicated but if used in conjunction with traps it may not be found necessary for the bait to be applied during the whole period.

A certain number of traps should be used (say one to each twenty trees) and very carefully watched, and as soon as it is found that *Ceratitis* are being caught in the traps bait spraying should be commenced and continued until no *Ceratitis* appear in the traps. The attention to the traps should be continued and bait spraying re-commenced when required. It is of course essential that the traps should be very carefully watched as their function is to indicate when the bait spraying should be carried out, and the spraying must be done as soon as the presence of *Ceratitis* in the traps indicates that it is necessary.

These traps should in particular be placed on trees which tend to ripen their fruit early owing to irregularities of the soil or other causes.

In addition, all fallen fruit should be collected and disposed of daily and as far as possible different kinds of fruit trees should not be grown together, as in mixed plantations *Ceratitis* is given the greatest opportunities for breeding all the year.

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Two series of experiments are now being carried out by the Agricultural Department near Nicosia to compare the baits described above and also to test other materials which may possibly be of value as baits.

Injurious Insects of Cyprus.

BY H. M. MORRIS, M.Sc., F.R.E.S., *Government Entomologist, Cyprus.*

[*Continued from June issue.*]

LEPIDOPTERA :

TINEINA :

Phthorimœa operculella, Zell. (Potato Tuber Moth, " Lita ").—This species is generally distributed, particularly in the lower parts of the Island, and causes damage to potato tubers, particularly to those in store in the summer, the autumn crop being little attacked while stored during the winter. Potato leaves and stems are also attacked but no attack on tobacco has been recorded in Cyprus.

Sitotroga cerealella, Ol.—Grain is usually stored without any precautions against insect attack, being generally heaped on the floor of a room or building which has not been prepared in any way since the removal of the previous crop. The same room is also often in use for other purposes. Grain also becomes infected while waiting loosely piled before threshing, and on the threshing-floors. This and several other grain, infesting species occur very commonly.

Platyedra gossypiella, Saund. (Pink Boll Worm).—A rather heavy attack by this species and *Earias insulana* usually develops in cotton bolls towards the end of the summer in all areas. The practice of sowing cotton rather late, so that the crop matures in October and November, causes this damage to be more serious than if the crop matured in August and September when the attack is slight.

Anarsia lineatella, Zell.—Generally distributed, attacking peach, apricot and cherry shoots.

Recurvaria nanella, Hb.—Attacks peach and apricot buds and appears to be widely distributed in the Island.

Syringopais (*Scythris*) *temperatella*, Led.—This insect is a serious pest of cereals in several areas and sometimes causes the complete loss of the crop in heavily attacked fields, though while occurring abundant in some localities it is apparently completely absent from closely adjacent localities. An account of it was published by Wilkinson. (1) The larvæ mine in the leaves of cereals, wild grasses and some other plants, appearing towards the end of December or early in January but becoming more noticeable in March. Pupation takes place in the soil early in April and the adults appear towards the end of April. The eggs appear to be deposited in the soil, where they or the first stage larvæ remain until the following winter. The adults exhibit strongly marked sexual dimorphism and are strong fliers, flying in the day time and becoming sluggish towards evening. It was discovered by Wilkinson that the adults were strongly attracted to light, but experiments carried out by the present writer, while amply confirming this, showed that males only were attracted, although in two successive nights a total of nearly 30,000 insects were estimated to have been caught in one light trap.

(1) Wilkinson, D. S., " Some Notes on *Syringopais temperatella*, Led., in Cyprus," *Bull. Ent. Res.*, XVII, 3, 1927, pp. 313–314.

Various control measures have been proposed but the most practicable appears to be the cessation of growing cereals for a period of years, other crops not attacked by the insect being grown, and all fields lying fallow being cultivated to destroy any larvæ feeding on weeds.

Plutella maculipennis, Curt. (Diamond-Backed Moth), frequently causes damage to cabbages and cauliflowers, particularly to seedlings.

Hyponomeuta padellus L. (Small Ermine Moth, " Sirividhi of Fruit Trees ").—This insect is a serious pest of apple and plum trees in the southern mountains, where these fruits are chiefly grown, frequently causing severe defoliation.

Prays oleella, Fabr. (Olive Moth), is a serious pest of olives and occurs in all the chief olive-growing areas. It has three generations during the year, larvæ passing the winter feeding on the leaves of olives, two leaves often being spun together and the larva living and feeding between them and also pupating in this situation. The adults of this generation appear early in April. The second generation of larvæ appears amongst the flowers, on which they feed, and the third generation of larvæ live inside the stone of the fruit. This is the most obviously destructive stage and the attacked fruit is often rather shrunken and wrinkled but probably the greatest damage is actually caused by the second generation. When these larvæ are full grown, during September, they leave the stone by the microphyle and bore straight out of the fruit, leaving it by a hole beside the stalk attachment, the effect of this boring being to cause a considerable proportion of the infested fruits to fall from the tree prematurely.

Polychrosis botrana, Schiff. (Grape Berry Moth, " Eudemis ").—This insect occurs wherever vines are grown and causes a considerable amount of damage, in some cases almost complete loss of the crop. There are three generations in the year, the larvæ of the first appearing during May and feeding on the flowers of the vine, spinning them together with a web, destroying the flowers and preventing the formation of the fruit. The larvæ of this generation pupate in the flower or young fruit bunches or on the leaves. Larvæ of the second generation appear about the middle of June and the larvæ of this and of the third generation enter the grapes, which are spoiled by their attacks and that of moulds which follow them in the damaged fruit. The winter is passed as a pupa under loose bark on the vine or stakes, under dead leaves on the ground or in similar places.

AEGERIDÆ :

Aegeria myopiformis, Bkh. (Clear Wing Moth).—Larvæ of this species live under the bark of apple and pear trees, probably spending two years in the larval stage, causing considerable damage to trees attacked.

COSSIDÆ :

Zeuzera pyrina, L. (Wood Leopard Moth), is a destructive and generally distributed pest of various kinds of trees (olive, pomegranate, apple, etc.), and causes a considerable amount of damage to fruit trees.

TORTRICIDÆ :

Cydia (Carpocapsa) pomonella, L. (Codling Moth) occurs abundantly wherever suitable fruits are grown, chiefly in the southern mountains where apples and walnuts are especially attacked, and also peaches, plums, pears and quinces. It may have three generations during the year but there is much overlapping and the third is probably not complete. Control measures against this insect have been enforced for a number of years but

are rarely thoroughly carried out, the irregular and over-closely planted trees making the work difficult, while effective spraying is hardly practicable in many cases in the small overgrown hill-side gardens. This insect occurs in almost all countries where apples are grown.

Olethreutes (*Argyroploce*) *pruniana*, Hubn., causes some damage by feeding on the young leaves of apricot and also attacks apple and plum. This insect occurs in England, France, South Russia, etc.

PYRALIDÆ :

Ephestia elutella, Hubn.—This insect causes some damage to stored grain but is not one of the most serious pests. This pest is very widely distributed having been carried from country to country in grain, seeds, etc.

E. kühniella, Zell., *E. afflatella*, *Mn.* and *E. cautella*, Wlk., also occur in dried fruit, etc.

Plodia interpunctella, Hbn.—Reported in dried figs from Cyprus in England.

Myelois ceratoniæ, Zell., is chiefly a pest of carob pods in store but also attacks the pods while they are on the trees. It has also been found attacking almonds on the trees, apparently preferring the shell, and it is also a pest of dried figs. This insect appears to occur in the Mediterranean basin but may have been introduced elsewhere in dried fruit, etc.

Epicrocis anthracanthes, Meyrick, bred from larvæ on leaves of almonds.

Hellula undalis, F., sometimes damages cabbages and cauliflowers both seedlings and older plants by boring the head. It has been recorded in other countries as damaging radishes in addition to cabbages and cauliflowers. This insect is recorded from India, Malaya, Japan, Queensland, etc.

Galleria mellonella, L. (Wax Moth).—Pest of bee hives.

Pyralis farinalis, L., occurs but is not abundant.

Margaronia (*Glyphodes*) *unionalis*, Hb., includes the olive amongst its food plants but is not usually sufficiently abundant to cause appreciable damage.

Phlyctænia fulvalis, Hb., bred on potato leaves but not a serious pest.

ZYGÆNIDÆ :

Zygæna (*Theresia*) *ampelophaga*, Bayle, (Vine Bud Moth), is a serious pest of vines in Cyprus, particularly in the southern mountains. It is not quite clear how the winter is passed but it is believed that this period is spent as a young larva under loose bark, stones, fallen leaves, etc.

The larvæ are present about the time the leaf buds swell and commence to open in April, and buds attacked at this stage are completely destroyed so that when many buds are so attacked the growth of the vine is seriously checked and may be entirely prevented. A second generation of larvæ appears at the end of May and in June and feeds on the leaves, but the damage then caused is of much less importance.

In Palestine this insect is a major pest in the hilly country and is considered to overwinter as a young larva about 5 mm. in length. In the Crimea the life history is similar, the insect occurring only in the valleys of the southern coastal district. In south-eastern France it is believed to pass the winter in the egg stage while in Italy it is believed that this period is spent in the pupal stage.

SPHINGIDÆ:

Acherontia atropos, L. (Death's Head Hawk-Moth), occurs occasionally on potato and *Datura*, and possibly also on vines.

Deilephila livornica, Esp., occurs occasionally on *Linaria* in gardens, and on vines.

Chœrocampa alecto, L., occasionally causes damage to vines and to virginia creeper.

THAUMETOPŒIDÆ:

Thaumetopœa wilkinsoni, Tams. (Pine Processionary Caterpillar).—This insect is a serious pest of pine trees in Cyprus attacking chiefly the Aleppo pine (*Pinus halepensis*), some areas of which are almost completely defoliated annually. Its life history has been fully studied in Cyprus by Wilkinson (1). In the plains the adults emerge chiefly during September and the eggs are laid in cylindrical masses on pine needles during September and the first half of October. The larvæ hatch at the end of October and early in November, and commence eating the pine needles, only the epidermis being eaten until the third instar. The processionary habit is already in evidence in the first stage larvæ, and within a few days they commence forming small silken nests. The later instars construct larger nests, which are used as shelters during the day-time although almost fully grown larvæ rest on the outside of the nest.

The later larvæ migrate from tree to tree, or for pupation, in single file, the head of one larva touching the end of the body of that in front. Pupation occurs in the ground during March and April, the summer being passed in the pupal stage in the soil.

GEOMETRIDÆ:

Sterrha herburiata, F. var., has been reared from larvæ found attacking dried plants in a herbarium collection.

NOCTUIDÆ:

Earias insulana, Bois. (Spiney Boll Worm).—This species, with *Platyedra gossypiella*, is a serious pest of cotton. The larvæ feed early in the season on the buds and leaves of the cotton plant but the most serious damage is caused later in the season when the maturing bolls are attacked. In addition to cotton this insect also attacks mpamia (*Hibiscus esculentus*) and it has been recorded elsewhere as attacking carob beans and maize, as well as other plants but it has not been recorded from these host plants in Cyprus.

Laphygma exigua, Hb., attacks a large variety of plants in its wide range which includes California, South Europe and most of Asia and Africa, but in Cyprus it is chiefly injurious to potato leaves and tomatoes. Amongst its food plants are cotton, beet, cereals, vines, cabbages and onions.

Heliothis (*Chloridea*) *obsoleta*, F.—This widely distributed species is recorded from tomato and maize, but it has been recorded elsewhere from cotton, stone fruits, tobacco, lucerne, etc. It is practically world-wide in distribution and is reported to occur in North, South, East and West Africa, Australia, North, South and Central America, West Indies and India amongst other countries. It does not appear to be as destructive in Cyprus as in many other countries.

(1) Wilkinson., D. S., "The Cyprus Processionary Caterpillar, *Thaumetopœa wilkinsoni*, Tams." *Bull. Ent. Res.*, XVII, 2, 1926, pp. 163–182.

Phytometra gamma, L. (Silver Y Moth), occurs in most European countries, South-West Asia, North Africa and Western-North America, and attacks a variety of plants. In Cyprus it is recorded from broad beans.

Prodenia litura, F., is another species of world-wide distribution and is chiefly a pest of cotton, although attacking a variety of crops. In Cyprus it is recorded as damaging potato tops but does not appear to be a pest of cotton.

Cirphis ? loreyi, Dup., bred from larvæ on maize and sorghum.

Other Noctuidæ whose larvæ cause damage to various crops and which occur in Cyprus include *Phytometra chalcytes*, Esp. (bred from larvæ on tomato), *Agrotis pronuba*, L., *A. ypsilon*, Hufn., *Euxoa radius*, Haw., and *E. spinifera*, Hb.

ARCTIIDÆ:

Ocnogyna lœwi, Zell. ("March Worm"), feeds chiefly on grasses in the larval stage, the larvæ living in colonies and moving in a disorderly mass from plant to plant. Cultivated plants are occasionally attacked, particularly broad beans. An attack on cumin has also been reported.

PAPILIONIDÆ:

Papilio machaon, L. (Swallow Tail Butterfly), is common and its larvæ have been found feeding on carrot leaves, and also on orange leaves.

PIERIDÆ:

Pieris brassicæ. L. (Large White Butterfly) and *P. rapæ*, L. (Small White Butterfly), occur abundantly and their larvæ cause damage to cabbages, cauliflowers, etc.

Aporia cratægi, L. (Black-veined White Butterfly), occurs locally in the southern mountains but no damage due to it has been recorded.

NYMPHALIDÆ:

Charaxes jasius, L.—Larvæ taken on young citrus trees.

Eugonia polychloros, L. (Large Tortoiseshell Butterfly).—Larvæ occasionally taken on pear and cherry.

Pyrameis cardui, L. (Painted Lady Butterfly), occurs abundantly throughout the year and its larvæ have been found damaging artichokes. An extensive invasion occurred in 1935 and the larvæ caused serious damage to artichokes.

LYCÆNIDÆ:

Lampides bœticus, L.—Larvæ of this species have been recorded as damaging French beans, broad beans and cow peas by feeding on the unripe seeds inside the pods and in the flowers.

COLEOPTERA:

CARABIDÆ:

Zabrus gibbus, F., which has been recorded as causing damage elsewhere, occurs in Cyprus but has not been recorded as destructive to crops.

TROGOSITIDÆ:

Tenebroides mauritanicus, L.—A pest of stored grain but is also predaceous on other stored grain pests.

NITIDULIDÆ:

Carpophilus hemipterus, L., bred from decaying tomatoes; is also a pest of dried fruit.

Carpophilus dimidiatus, F., taken on rotting orange, and is also a pest of dried fruit.

Meligethes æneus, F., occurs but no damage recorded.

CUCUJIDÆ:

Silvanus surinamensis, L.—A pest of dried fruit and stored grain.

COCCINELLIDÆ:

Epilachna chrysomelina, F., is a pest of melons and related plants, sometimes causing serious defoliation.

Several beneficial species of Coccinellidæ (Lady Bird Beetles) have been recorded, of which the most important are *Chilocorus bipustulatus*, F., and *Coccinella 7-punctuta*, L. The latter species sometimes occurs in enormous numbers on the rocks on the summit of Chionistra (6,400 feet) in the summer in company with *Dolycoris baccarum*, L. When seen from a little distance small rocks or patches of stone appear completely scarlet from the numbers of this insect resting on them.

DERMESTIDÆ:

Dermestes undulatus, Brahm., has been recorded but not causing noticeable damage.

Anthrenus verbasci, L., is a troublesome and destructive pest of insect collections.

Attagenus bifasciatus, Ol., has been taken in the open but is a possible pest of stored materials.

Trogoderma versicolor, Creutz., is a pest of stored grain.

CLERIDÆ:

Trichodes laminatus, Chev. var. *cyprius*, Reitt., *T. laminatus*, has been recorded as attacking, in its larval stage, eggs of the locust *Dociostaurus maroccanus*, in Iraq. This habit has not been observed in Cyprus.

Other species of *Trichodes* not recorded from Cyprus have been recorded as destroying eggs of this locust in Turkestan, Algeria and Spain.

ANOBIIDÆ:

Lasioderma serricorne, F. (Tobacco Beetle), a pest of cured tobacco. Tobacco leaf is attacked and damaged while awaiting export and so also is imported leaf in the stores of the cigarette factories. Probably the most serious damage is that which occurs to the cigarettes after they have been packed and exported, the workings of the beetles and their larvæ causing holes in the paper of the cigarettes. Some precautions are taken in some of the factories and in one or two cases the cigarettes are fumigated with HCN before export. This insect has also been found damaging stored tobacco seed. Other stored materials are also attacked, but grain is not usually attacked except after long storage.

PTINIDÆ:

Ptinus fur, L., a pest of books, woollen goods, skins, etc.

BOSTRYCHIDÆ:

Schistoceros bimaculatus, Ol.—Taken boring in twig of apple, recorded elsewhere (Daghistan) as a vine pest.

Rhizopertha dominica, F.—Found damaging stored barley.

BUPRESTIDÆ :

Ptosima undecimmaculata, Hbst.—Borer in apricot trees and probably attacks other fruit trees and carob trees being recorded on the latter in Malta and Italy. Other species belonging to this family also occur and are probably of similar habits but no damage caused by them has been recorded.

Agrilus roscidus, Ksw., bred from apple trunk.

Sphenoptera tappesi, Mars., bred from peach trunk.

ELATERIDÆ.—No damage by "wireworms" has been recorded in Cyprus and they have not been observed in any numbers, although adults of some four species have been taken, of which *Melanotus fusciceps*, Gyll, var., might be injurious.

TENEBRIONIDÆ.—Larvæ of this family, some of which are very similar in appearance to the true "wireworms" have once or twice been found in circumstances which suggested that they were causing damage, such as in the stem of a potato plant, in the soil about the roots of potatoes or inside the stem and roots of melon plants, but no serious damage to crops has been caused.

Several species occur which belong to genera other species of which have been recorded elsewhere as causing damage to crops, but no damage has been recorded as due to the species occurring in Cyprus.

Opatroides punctulatus, Brull., causes damage to young tobacco plants by eating the stems at or just below ground level.

Zophosis punctata, Brull., occurs in company with the above species and apparently causing similar damage.

Gonocephalum rusticum, Olive., also occurs commonly and may cause similar damage.

Hypophlœus fraxini, Kugel., bred from pine logs with *Ips erosus*, Woll. and *Myelophilus piniperda*, L.—This species probably feeds only on fungi in the galleries made by the other species.

Tribolium castaneum, Hbst.—A pest of stored grain, flour, etc., also recorded from cotton bolls.

Tribolium confusum, Duv.—A pest of stored grain, flour, bran, etc. This species is probably more abundant than the preceding and occurs in grain stores very commonly. It has also been taken under bark of trees.

CISTELLIDÆ :

Omophlus propagatus, Kirsch.—This species occurs abundantly in several parts of Cyprus. In corn fields it does not appear to cause injury, but it damages the flower buds and flowers of olives and also attacks the flower buds of vines. The most serious damage caused by it has been observed on vines which in one area suffered severely in 1932 from its attacks, the vines being almost completely stripped of flower buds.

Omophlus curvipes, Brull., has been seen occurring in large numbers on trees, etc., but no damage has been recorded.

BRUCHIDÆ :

Bruchus dentipes, Bdi., is a common pest of broad beans and peas.

Bruchus lentis, Fröb. and *B. chinensis*, L., are recorded from lentils, *B. rufimanus*, Boh., from broad beans and *B. analis*, F., from peas.

Pseudopachymerus lallemanti, Mars., has been recorded in seeds of the ornamental *Acacia farnesiana*.

Spermophagus sericeus, Geoff., has been recorded only on flowers of leek in the open.

CRIOCERIDÆ :

Crioceris bicruciata, Sahlb. (Asparagus Beetle).—Recorded on cultivated asparagus which, however, is little grown, but *Asparagus acutifolius*, L., and *A. stipularis*, Forsk., occur commonly.

Lema melanopa, L., causes a certain amount of damage to the leaves of cereals in spring, but no case of severe or widespread damage has been recorded.

CLYTRIDÆ :

Clytra nigrocincta, Lac. var.—Recorded as occurring in numbers on turpentine tree (*Pistacia* sp.) and damaging young leaves and shoots.

Clytra atraphaxides, Pall.—Reported as eating almond leaves.

Gynandrophthalma limbata, Stev.—Recorded as causing considerable damage to almond trees by destroying the flowers and young leaves.

Rhaphidopalpa (*Aulacophora*) *foveicollis*, Küst., causes damage to melons and other cucurbits in most areas where they are grown. The adult insects hibernate and appear in spring when the melon plants are young, causing damage by eating the leaves, the damage being particularly severe when the plants are attacked at the cotyledon stage as the crop may then be completely destroyed and re-sowing necessitated. Eggs are laid in the soil near the plants and the larvæ live in the soil and feed on the roots. Pupation occurs in the soil and there are probably three or four generations during the summer.

HALTICIDÆ (Flea Beetles) :

Haltica ciliciensis, Weise.—Damage by this insect to the leaves of imported " American blackberry " has been recorded in the southern mountains, where also this species has been found abundantly on wild blackberry.

Aphthona æneomicans, All., occurs in large numbers on the leaves of walnut, hazel, etc., but has not been recorded as causing damage.

Aphthona euphorbiæ, Schrank., causes considerable damage to young flax at times and has also been found in large numbers on olive and cherry trees but no damage to these trees or neighbouring crops was observed.

Longitarsus parvulus, Payk., occurs on flax in company with the preceding species but apparently in smaller numbers.

Phyllotreta cruciferæ, Gœze.—Recorded as causing damage to cauliflowers, but not usually destructive.

Phyllotreta corrugata, Rche.—Sometimes causes severe damage to stocks and wallflowers, young plants being completely destroyed.

Several other species of Halticidæ occur sometimes in considerable numbers, but no damage by them has been recorded.

Sphæroderma testaceum, F., is a minor pest of artichokes.

Podagrica malvæ, Ill.—This species is reported to feed on malvaceous plants and is an occasional pest of cotton elsewhere. It has once been found in Cyprus causing a good deal of damage to young orange leaves, and has also been found damaging *Hibiscus esculentus*, and artichokes.

CASSIDÆ :

Cassida ? palestina, Rch., occasionally causes damage to the foliage of artichokes.

Hypocassida subferrunginea, Schr., apparently an occasional pest of beet in Italy, occurs but has not been recorded as causing damage.

CERAMBYCIDÆ :

Cerambyx heros, Scop., has been recorded (in *Cyprus Agricultural Journal*, XVII, 1922, p. 28), as causing considerable damage to carob and walnut trees. The eggs are stated to be laid beneath the bark in July. or in crevices caused by faulty pruning. Larvæ penetrate the wood and feed for 3 or 4 years, pupating in the spring.

This species has not been recorded since 1922 and no specimens appear to have been preserved, so that the identification cannot be confirmed.

Cerambyx velutinus, Brull., occurs rather commonly, attacking fruit and other trees. This may be the species intended in the reference to *C. heros* referred to above.

Hylotrupes bajulus, L., occurs commonly in the woodwork of houses. This species appears to prefer dry coniferous wood and thus finds very suitable conditions, while the frequent cracking of woodwork during the dry summers gives ample opportunities for oviposition. This species is a pest in Northern Europe, particularly Denmark, Germany, Russia, and in Siberia. The larval stage is stated to last two years or longer in Denmark and Russia.

Chlorophorus varius, Mull., has been bred from the trunk of fruit trees and the adults are seen fairly commonly.

Other species which occur are *Leptura revistata*, L., *Stromatium unicolor*, Ol. (taken on olive-tree) and *Purpuricenus budensis*, Gotz. The latter was taken in bait pans containing molasses hung in apple trees to capture *Cydia pomonella*. No records of damage caused by these species have been obtained.

LAMIIDÆ :

Niphona picticornis, Muls., bred from trunk of pomegranate.

Pogonochærus perroudi, Muls., bred from pine logs but possibly only dead trees are attacked.

Agapanthia carduri, L.—Adults found fairly commonly on flowers, especially of thistles. This species is stated to be a pest of artichokes in Malta but has not been recorded as causing damage in Cyprus.

Agapanthia dahli, Richt., has not been recorded as injurious in Cyprus but is a pest of sunflowers in Southern Russia. Sunflowers are not grown as a crop in Cyprus.

PRIONIDÆ :

Rhesus serricollis, Mors., occurs fairly commonly. A number of larvæ from which adults of this species were reared were found to have very considerably damaged the trunk of a large plane tree at Nicosia, which was broken off in a gale.

CURCULIONIDÆ (Weevils):

Anthonomus pomorum, L. (Apple Blossom Weevil), occurs on apples and pears and is a serious pest in some localities. The larvæ live in the unopened blossoms which they destroy, the petals turning brown and the whole blossom eventually falling from the tree.

Anthonomus cyprius, Marshall, causes damage similar to that caused by the preceding species, to peaches and almonds.

Apion semivittatum, Gyl., *A. viciæ*, Payk., *A. vorax*, Hbst., and *A. radiolus*, Kirby., have been found together in considerable numbers on walnut trees, but no appreciable damage has been recorded. *Apion radiolus*, Kby., and *A. æneum*, F., have been found similarly on almond and cherry trees.

Baris timida, Rossi.—Adults taken on wild malvaceous plants in spring and in tunnels in roots of hollyhocks in winter. It appears that this species might attack cotton but no such attack has been observed.

Brachycerus sp., occurs and species of this genus cause damage to garlic and to other bulbs in Italy and elsewhere but have not been recorded as injurious in Cyprus.

Calandra granaria, L. (Grain Weevil).—A common pest of stored grain.

Calandra oryzæ, L.—A common pest of stored grain.

Calandra sculpturata, Gyl.—Intercepted at a port in seed of *Eugenia jambolana* from Tanganyika Territory.

Chiloneus brevithorax, Desbr., taken feeding on leaves of citrus.

Hypera variabilis, Hbst., a pest of lucerne and cotton elsewhere, occurs in Cyprus but has not been recorded as causing damage.

Lixus lutescens, Cap.—Once taken on artichokes causing slight damage.

Lixus ascanii, L.—Adults taken on wild cruciferæ and a possible minor pest of cabbages, etc.

Lixus algirus, L.—Adults taken while eating the leaves of almond, peach and orange trees, and ovipositing in stem of mallow.

Larvæ of *Lixus* sp., are frequently found in the stems of broad beans, attacked plants being stunted and unhealthy.

Pachytychius hordei, Brulle, has been recorded from wheat sheaves, but does not appear to have caused appreciable damage.

Psalidium aurigerum, Desbr., has been once recorded in the adult state as damaging the buds of newly-planted vine cuttings.

Rhynchitis ruber, Fairm., (Olive Weevil), causes damage to the leaves, shoots and fruit of olives, particularly in some areas near Morphou. The adults appear in April and May and feed at first on the young leaves and shoots and later attack the fruit as it commences to form. They cut through the epidermis and eat the flesh beneath, this damage later healing but leaving a hard discoloured patch and causing the fruit to be misshapen, particularly when several such patches occur on a fruit. Eggs are laid in holes from which the adults have fed and the larvæ on hatching burrow directly into the stone, which is still soft at that time. The larvæ are full grown shortly before the olives are ripe, in September or October, and bore through the stone and flesh and pupate in the ground. There is only a single generation in the year and only a single larva develops in a fruit.

Sibinia planiuscula, Desbr.—Once recorded in numbers on cotton bolls near Larnaca, but not subsequently found in that locality.

Sitona oculata, Küst.—Damaging leaves of spinach-beet.

Sitona lineata, L. and

Sitona limosa, Rossi.—These species frequently cause a certain amount of damage to the leaves of broad beans.

SCOLYTIDÆ (Bark Beetles):

Coccotrypes dactyliperda, F.—Taken in date stones.

Phlœosinus armatus, Reitt., occasionally causes damage to cypress trees, but is not found in great numbers.

Scolytus rugulosus, Ratz.—Taken mining in twigs of cherry, loquat and other fruit trees. This species attacks various kinds of fruit trees elsewhere.

Scolytus amygdali, Guer., is considerably more abundant than *S. rugulosus* and has been taken on plum, apricot, apple and almond trees and probably also attacks other related trees.

Phlœotribus oleæ, F. and

Phlœotribus caucasicus, Reitt.—These two species are common pests of the olive tree, to which they frequently cause serious damage. The adults attack the young twigs before tunnelling into the branches where they oviposit.

Ips (*Pityogenes*) *porifrons*, Eggers.—Recorded from *Pinus halepensis*.

Ips erosus, Woll., has been bred from pine logs.

Myelophilus piniperda, L., occurs commonly and causes damage to the young shoots and trunks of pine trees.

CETONIIDÆ:

Epicometis hirta, Poda, and

Oxythyrea abigail, Rche., occur commonly on flowers in the spring and are sometimes troublesome in gardens, and also damage young wheat ears and young almonds. The former is also recorded as damaging orange blossom and vine leaves and as causing a considerable amount of damage, in its larval state, to seedling trees in nurseries.

Protœtia cuprea, F., recorded as attacking pear fruit.

Protœtia æruginosa, Drury.—Taken in bait pans containing sugar hung in apple trees.

Protœtia libanii, G. and P., taken damaging a species of thistle.

DYNASTIDÆ:

Oryctes nasicornis, L., var. *gryphus*, Ill.—Newly emerged adults still in pupal cell taken in soil beside decaying roots of apricot tree.

Temnorhynchus baal, Rch., has been taken tunnelling into water melon.

MELOLONTHIDÆ:

Anoxia meridionalis, Rtt., and

Haplidia fissa, Burm.—These two leaf-eating species occur but have not been associated with any particular plant.

RUTELLIDÆ:

Adoretus pullus, Baudi, frequently occurs in numbers and causes damage by eating the leaves of pear, almond, rose and other trees.

[*To be continued in the December issue.*]

A Study of Colocasia.

(*Colocasia antiquorum* Schott.)

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PART I.—ORIGIN AND AGRICULTURE.

COLOCASIA, or taro, is one of the most valuable as well as one of the most ancient food plants of man and different varieties are still in cultivation over a region extending from New Zealand up to the line of Cyprus and the Dodecanese in the Mediterranean, and from the West Indies to China. It grows only where it has been taken by the hand of man, since it is believed to seed no longer, and thus furnishes evidence of his migrations. But as soon as man ceases to cultivate it year by year from the tubers it flourishes no longer.

Nomenclature and History.

Like other widely distributed food plants it is known under many names; consequently there is much confusion in its nomenclature. It is a species of the genus Arum belonging to the natural order of Araceæ. But many plants formerly referred to Arum are now placed under other genera, while numerous plants of other genera are popularly called arums, as for example, the water-arum and the arum-lily. About a dozen species are found in Europe and the Mediterranean littoral and in Cyprus the genus is represented by some six or seven species, determined by earlier botanists, and listed in Jens Holmboe's classical monograph ([1]). Here the cultivated plant is given as *Colocasia antiquorum* Schott, for which the terms *Arum Colocasia* L., *Arum esculentum* and *Caladium colocasia* are presumably synonymous; it is a variety of, or certainly closely identified with, *Colocasia esculenta.* According to Barrett,([2]) no less than 300 distinct varieties are known.

The plant and its varieties goes by no less a number of popular names in different parts of the world where it is grown as a food-plant. In English it is known as taro—its native name in Polynesia—or colocasia, and sometimes as elephant ear. In America it is the dasheen; in China bun-long-woo; in Egypt the kolkas, and to the Greeks of the Mediterranean, colocasi. In Jamaica the name in general use is the very confusing term "cocoes" but in other parts of the West Indies the plant is known as "eddoes" and "tanias," the latter having several different spellings. The term tania, however, seems to be in general use throughout the West Indies and South America ([11]).

The cultivated plant is considered to be a native of India but it has been known in Egypt from time immemorial and is referred to by Pliny as *Arum œgyptum* ([3]). As might be expected references to the plant are not lacking in ancient literature. It is mentioned in Chinese writings of 100 B.C. and by Dioscorides, but European botanists gained their knowledge of the plant from Egypt. Lusignan ([4]) makes the first reference to Colocasia antiquorum in Cyprus in 1573, but its cultivation in the Island is of much earlier date. According to Oberhummer,([4]) however, the plant may be seen represented in the design of capitals of buildings dating from the 13th and 14th centuries.

Wild Colocasia.

As already indicated Holmboe (1) describes several other species growing wild and known to the villager as ἀσκοκολοκάσι, or wild colocasi. They are sometimes confused with γλυκοκολοκάσι or Jerusalem artichoke (*Helianthus tuberosus* L.), which contain no starch and also cultivated on a small scale in the Island and from which, of course, they are distinct. The true sweet potato (*Ipomœa batatas N.O. Convolvulaceæ*) is not a field crop here. The most common of the wild arums found in Cyprus are :—

A. hygrophilum : Requires a habitat of damp, shady places, such as in the cotton fields about Kythrea. It is found almost everywhere when the above conditions are present and is common on the plain and foothills.

A. oriental var., gratum : Cultivated fields around Kythrea.

A. Dioscoridis : Can flourish under drier conditions and is found commonly almost everywhere on the plain, especially in the eastern part, in ditches and hedgerows. It is found plentifully about Ayia Napa, for example, along the Kyrenia coast and in the Castle of St. Hilarion.

Arisarum sp. : Two varieties have been observed on the Troödos range ; the flowering spike of red berries appears in late autumn (October and November).

Most of the above species thus occur more commonly in the Island than has previously been supposed (*cf.* Holmboe (1)). With the exception of Arisarum, these species flourish during spring and early summer and are conspicuous by their characteristic spike of green berries turning to red when the rest of the plant has withered. Apart from their botanical interest these species of wild colocasia are of importance because in time of drought and bad seasons villagers prepare a fecula from the underground tubers by drying them in ovens and grinding. This flour they then bake into bread. All arums appear to contain an acrid substance, less perhaps in the cultivated tuber, which is readily dissipated by the heat of drying.

Toxicity.

A sixth and poisonous species, again occurring in a damp and shady habitat, has been found near the monastery of St. Neophytos, Paphos, and I am indebted to Mr. G. Frangos, late Government Inspector of School Gardens, for bringing this interesting species to my knowledge. The distinguishing features are : the stem, which is mottled with purple black spots ; the long pointed spike about 4–5 times the length of that of the ordinary arum ; and the offensive smell of the poisonous red berries. The leaf has a strong caustic taste and may cause excoriation ; it is also poisonous. From these characteristics there would appear to be ilttle doubt that the plant in question is *Arum maculatum*, or a close variety of it and known here as Δρακοντια So far as the author is aware it has not previously been recorded for Cyprus. *Arum maculatum* is a common plant in England and goes by the popular names of " lords and ladies," " cuckoo-pint," etc.(5) It puts up its leaves and spathe in early spring, the leaves being glossy and spotted. The poisonous character of the succulent red berries and the leaves has long been

recognized. Starch, in the form of an arrowroot, was formerly extracted from the tubers, which after heating is innocuous. The product from this source is spoken of as Portland arrowroot, since this species of arum was formerly much cultivated in the Isle of Portland. It is perhaps noteworthy that the starch has been sold in Paris as a cosmetic under the name *poudre de Chypre* ([6]).

Feeding Experiments.

It was hoped to obtain data on the toxicity of the leaves of cultivated and wild colocasia but this was not possible as the experimental animals refused to ingest them. In these experiments fresh young leaves of *Colocasia antiquorum* were offered to groups of young albino rats, rabbits and guinea pigs. The leaves were simply washed and given whole before the morning ration of basal diet. The rabbits tried a little of the stalk but discarded it quickly on discovering its causticity; only the rat succeeded in ingesting a little leaf tissue and from its resulting behaviour evidently suffered considerable irritation when the causticity developed. The writer and L.C.H. also ingested some of the fresh leaf tissue with the result that the taste was first found to be not unpleasant but after one or two minutes a most unpleasant sensation of tingling and burning of the mucous membranes of the tongue and mouth developed, for which washing out with water was without effect. Gradually the sensation passed off. Similar results were obtained in animal experiments with the fresh leaves of *A. Dioscoridis*. Domestic animals in Cyprus rarely eat the foliage of wild or cultivated arums, the only exception to this being the pig, which apparently can ingest the dry leaves of the cultivated plant but with a definite preference for the stalk tissue. This is quite distinct from the use of potato plants as feed for animals as it is the general practice in Cyprus to feed sheep, goats and sometimes oxen on potato plants which have commenced to wither. Potato plants have even been used as human food in years of drought in the Island (Willimott).([7])

The irritation experienced with all species of arum was long ago attributed to the presence of crystals of calcium oxalate (raphides) in the plant cells of members of this family. Pedler and Warden,([8]) who were the first to describe this phenomenon, believed that the unpleasant effects were explained by physical contact with the needle-like crystals. Safford,([9]) however, in 1905 was able to show that the irritation was chiefly due to the force exerted when the crystals were ejected from their capsules in the presence of water; and Black ([10]) in 1918 demonstrated that the capsules lost their ability to expel crystals after the plant had been cooked or dried. In the light of these facts the results of the feeding experiments described above are explained but the question as to whether species of arum (*e.g.* maculatum) contain, in addition to the calcium oxalate, some other organic poison of unknown chemical composition, would appear to warrant further investigation.

Although in Cyprus the principal use of colocasia leaves is for manure, elsewhere, as for example in Jamaica ([11]) and the Island of Guam, ([9]) the young green leaves are boiled and eaten as spinach while the mature leaves and stalks are said to make excellent fodder for cattle and pigs. Taro shoots and taro stalks are now produced in Hawaii as table vegetables and their nutritive constituents and mineral elements have been

investigated ([12]). It is noteworthy that in the past the leaves of colocasia grown in Egypt, as also those of the banana, have been used to adulterate tobacco.([13]) In tropical countries colocasia is often sown as a shade plant for crops such as young cacao or spice, but this expedient is not used in local agriculture. However, fields and plots of colocasia are frequently to be found hedged round with maize while between the rows cucumber, tomato, or marrow are often planted as a catch crop. The reason for this is the high cost of production of colocasia and so the Cypriot farmer tries to obtain something in addition for his expenditure of manure, water and labour.

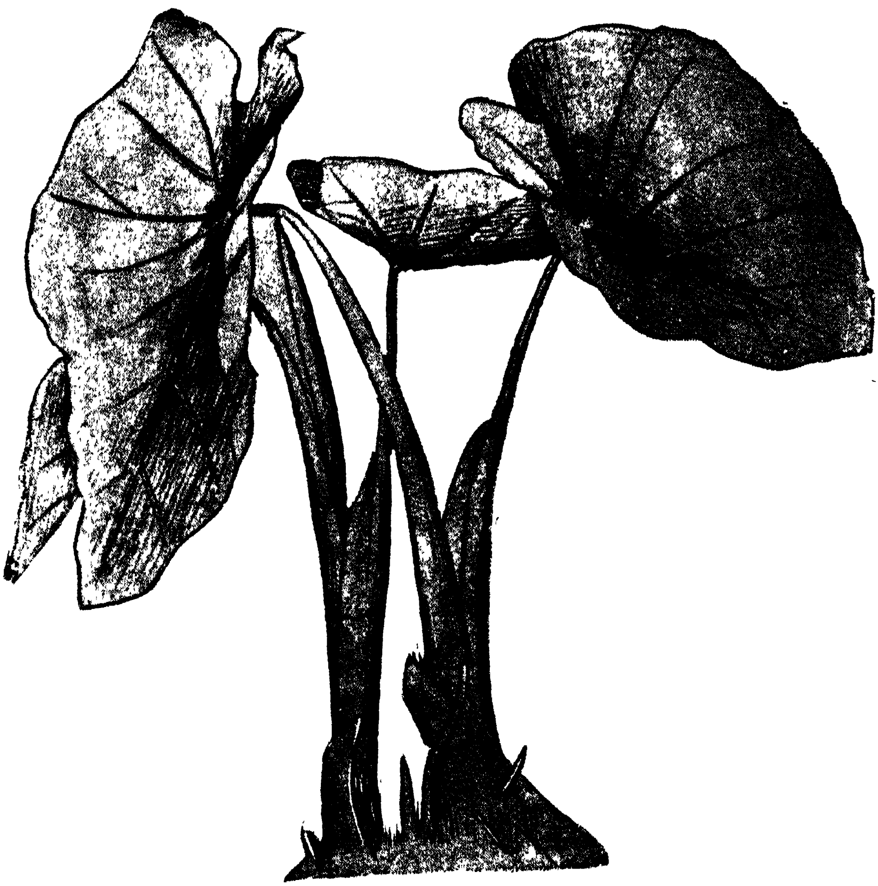

Fig. 1.—Colocasia antiquorum Schott.

The Cultivated Plant.

As a field crop colocasia is indeed one of the most striking by reason of its stately, dark green foliage ; in fact varieties of the plant in Europe are grown solely for their handsome ornamental effect, as for instance, in the Luxembourg Gardens, Paris.

The plant has no true stem ; the large, graceful, heart-shaped leaves, which may reach any height up to seven feet, being borne on long petioles or foot-stalks rising from the ground. It is a monocotyledon but forms an exception in having its leaves net-veined as in the case of a typical dicotyledon. The inflorescence is noteworthy since it exhibits male flowers on the upper part of the spike and female flowers below ; in neither case are sepals or petals found. Under conditions of cultivation the plant does not always flower. Fortunately up to the present the crop in Cyprus has been free from disease of any kind.([14]) The tuberous rhizomes are not usually more than six inches in diameter, excluding the very small tubers used for seed, and found adhering to the parent body.

Varieties and Production.

Two local varieties are recognized and cultivated, viz. Karpas and Morphou, of which the latter is more esteemed because of its sweetness, flavour and lighter colour. Consequently it commands a higher price in the local markets. The Morphou tubers are longer in shape and of somewhat lighter colour than those of the Karpas which are more spherical. In both varieties the outer skin is roughly marked with rings of dark-brown scales. The production centres round the village of Ayios Andronikos in the Karpas and round Lapithos in Kyrenia District and the cultivation would appear to be spreading. The crop, of whichever type, is entirely for local consumption as there is no export trade. Its chief, and more important competitor, is the potato, and in Table 1 ([15]) the annual production of colocasia is compared with that of the potato over the last five years. From these data it appears that the acreage under colocasia remains fairly constant while the yield, possibly as a result of better cultivation, shows a small increase. It cannot, of course, rank with the potato crop, largely produced for export, and now well established in local agriculture. [*vide* ([7])]

TABLE 1.—ANNUAL PRODUCTION OF TUBERS.

	Colocasia		*Potatoes*	
Year	*Area* *acres*	*Gross Yield* *okes*	*Area* *acres*	*Gross Yield* *okes*
1931	371	1,088,838	5,814	16,102,320
1932	273	802,106	6,451	17,714,571
1933	241	846,463	4,239	12,087,707
1934	282½	967,029	5,263	15,088,005
1935	277	1,233,597	6,165	17,325,689

Cyprus oke = 2.8 lb.
800 okes = 1 ton.

Cultivation.

A deep or sandy loam with plenty of organic matter in it suits colocasia best and to this end the land is well manured with old stable manure about a month before planting. The crop does not do well on very sandy or clayey soils. Given an abundance of moisture and heat, as in a tropical climate, the plant flourishes and can stand great extremes of heat and humidity. As already stated, the major crop is found in the Districts of Morphou and Karpas but, as will be seen from Table 2, ([15]) there is a small

production for local needs in each administrative district. The crop is raised on a four-year rotation of colocasia, cumin, fallow, wheat. To obtain the best results the cultivation requires some experience and care (*cf.*([11])). First, a suitable piece of land is chosen, which must be level, and this is given three or more deep ploughings: the first usually in October, the second in December, and the third or fourth just before the time of planting in March or April. The plants are propagated from the very small tubers reserved for this purpose. The system in Cyprus is to prepare the land for sowing by heaping up the soil so as to form a series of symmetrically winding ridges and troughs. The purpose of this is to allow the irrigation water to stand in the troughs between the ridges for the longest time possible and thus explains the necessity of choosing a level planting ground. Drills are then made in the troughs to a depth of about six inches to receive the seed-tubers, which are planted in rows of three foot interval and with a distance of about one foot between individual plants.

TABLE 2.—PRODUCTION OF COLOCASIA BY DISTRICT.

	1934		1935	
	Acres	*Okes*	*Acres*	*Okes*
Nicosia (Morphou) ..	94	211,945	32	273,935
Famagusta (Karpas)	134	614,674	152	685,952
Larnaca	0½	1,000	3	14,500
Limassol	1	1,306	5	8,900
Paphos	19	23,812	36	51,490
Kyrenia (Lapithos)	34	114,292	49	198,820
Total	282½	967,029	277	1,233,597

After planting the crop is immediately irrigated with sufficient water to allow it to stand between the winding ridges at a depth of about six inches. Ample irrigation and a good tilth are essential for the cultivation. Throughout April and May the crop must be irrigated every 8 days, in June and July every 4 days, and in August at least every second day. At this period it is preferable to irrigate at night or before sunrise. During September irrigation is carried out every 4 days and every 8 days in October, in which month it ceases. With a crop such as this, requiring a liberal water supply, it is essential that weeds should be kept down by systematic hoeing and earthing-up. The first hoeing is given a month after planting; the second, with good earthing-up, in July; and a final treatment as required, during which the bottom leaves are removed. The crop is ready for lifting from October onwards to January and there is the advantage that the tubers may be left to remain in the ground without deterioration for a considerable time after they are ripe. The crop is thus dug up as and when required for market. The tubers are then sorted into three categories according to size and shape, viz: (*a*) large, oval tubers weighing ½–1 oke; (*b*) long, narrow tubers weighing ¼–½ oke; (*c*) small, round tubers for seed kept in an earth hole until required. The average retail price during 1935 was 1½ piastres per oke for Karpas colocasia, and 2 piastres for Morphou, compared with 1½ piastres for potatoes.

PART II.—COMPOSITION AND NUTRITION.

Yield and Cost.

It is noteworthy that this is the most expensive annual crop of any kind to produce in Cyprus and in this connection the comparative data in Table 3 are instructive. The yield of colocasia per Government donum ranges between 2,500 and 4,000 okes, with an average of about 3,000 okes, as compared with a yield for potatoes ranging between 1,500 and 3,000 okes per donum, with an average of about 2,000 okes. Thus an average crop of colocasia may be reckoned to yield approximately a 50 per cent. higher return than its chief competitor, the potato.

TABLE 3.—APPROXIMATE COST OF PRODUCTION OF SOME STAPLE CROPS IN CYPRUS.

Crop	Cost per donum in £ sterling £	s.	cp.	
—				
Colocasia	15	0	0	
Potato	£3—4	0	0	
Wheat	–	15	0	
Barley	–	10	0	
Oats	–	7	0	
Broad beans	1	10	0	
Vetches	–	4	0	
Favetta	–	5	0	
Cowpeas	2	3	0	
Water melon	4	0	0	
Cumin	2	0	0	
Linseed	2	10	0	
Sesame	1	7	0	
Onion	1	5	0	
Cotton	3	5	0	
Tobacco	2	0	0	
Citrus	5	0	0	(after trees come into bearing.)

The figures in this table are based on the cost of production at the Experimental Farm, Morphou, and are higher than those of the average Cypriot farmer, who has no labour charges to meet.

One Government donum = ⅓ acre approximately.

Chemical Composition.

Carbohydrate, mostly in the form of starch, is of course the chief constituent and renders it the valuable energy food which is much esteemed by the Cypriot. In Table 4 are summarized analytical data on the composition of both types of local colocasia, which do not appear to have been analysed in full previously. An American analysis by Blasdale, ([16]) and another, for the purpose of comparison on the potato, by Plimmer ([17]) are also included. The analyses were made in duplicate on fresh, raw, whole tubers after they had been washed; Plimmer's analysis is on the cleaned raw tubers. The tubers are used as vegetables like potatoes and when boiled with a liberal addition of lemon juice, change to a distinct creamy colour and develop a rather sweet and pleasant flavour. It is eaten with boiled meat dishes, especially in winter when it is at its best, but the tubers can also be made into a nutritious soup. Throughout the tropics they are a staple food of the indigenous classes but are appreciated also by Europeans who have acquired a taste for them.

TABLE 4.—CHEMICAL COMPOSITION OF COLOCASIA AND POTATO.

	Morphou	Karpas	Large Tubers U.S.A. (Blasdale)	Potato, (Plimmer)
	%	%	%	%
Water	75.7	78.6	74.20	76.1
Ash	1.5	1.4	1.31	1.7
Fibre	0.8	0.7	0.98	1.1
Protein (N × 5.68)	1.9	1.8	1.70	2.1
Starch (by difference)	16.1	13.7	17.95	19.0
Sugar	3.8	3.6	1.15	—
Fat	0.2	0.2	0.27	0.05
Total	100.0	100.0	97.56	100.05
Energy value, Calories, per 100 grams	91.2	80.2	87.8	87.0

The ash, like that of most root vegetables, is of alkaline reaction. The fat and fibre are almost negligible. The protein is of albuminoid character but the nitrogenous matter is also made up of non-protein nitrogen. Contrary to experience with the potato, older tubers of colocasia were found to yield on analysis higher figures for total nitrogen than fresh young tubers. The most important constituent, the carbohydrate, consists chiefly of starch with a little reducing sugar. A specimen of the starch was extracted for examination by the usual process of finely rasping the clean tubers, washing out the starch granules, purifying by agitation with clean water, settlement of the granules, decantation, and slow drying in the air.

Poi.

The most important preparation of colocasia, or taro, is the fermented food, known in the islands of the Pacific as *poi*, and which appears to be a product peculiar to Polynesia. In any case, although colocasia is an economic crop in the littoral of the Levant, a preparation such as poi is unknown in Cyprus and, according to Borg,([18]) in Malta also. But to the native Hawaiian poi is, in fact, " the staff of life " and his cultivation of the taro crop is largely for that purpose. Although not used to the same extent as formerly, it is still a staple food of the native Hawaiian and its manufacture is controlled by law ([19]). In the Sandwich Islands (Hawaii) its use is of great antiquity and the earliest known reference to taro and poi, in modern times, is that of Captain Cook (1784), ([20]) who not inaptly described the latter as " a disagreeable mess from its sourness, greedily devoured by the natives."

The manufacture of poi ([19]) consists simply of two processes: (1) the cooking, peeling, and grinding of the taro corms; (2) the incubation and fermentation with water of the crushed product. European writers do not always appreciate the fact that the taro is first well cooked. Three kinds of poi are thus produced, depending upon the amount of water to be added, and known respectively as one, two, or three-finger poi. Allen and Allen,([19]) who studied the question of taro culture in Hawaii, described the processes of poi-making in detail especially from the bacteriological standpoint. These authors showed that the acid fermentation is due primarily to bacteria, and secondly to yeasts, by inoculation from the original corms. They drew the important conclusion from their work

that the fermentation of poi bears a close analogy, in the types of organism concerned and the products of fermentation, to the souring of milk. Lactic acid, *inter alia*, was the predominating organic acid found. These authors also plotted the development of pH values with time, in the case of raw taro corms (pH 6.6), cooked taro (pH 6.37), and the resulting poi.

Specimens of poi were prepared in this laboratory from Morphou tubers by simply washing and grinding and allowing the paste to ferment. Changes were observed in odour, taste, consistence, and colour ; the odour was unpleasant and the colour a shade of lavender. Lactic acid was found to be the chief product of fermentation but other fatty acids such as acetic were also present.

Many observers have attributed the magnificent physique of the native Hawaiian to the fact that poi was the staple food. Since the resemblance of poi with *yoghourt* (soured milk) is a close one, it is not surprising that poi has long enjoyed a wide reputation in nutrition and therapeutics. Apart from its use as a staple food poi has been employed successfully in different gastric disturbances and intestinal conditions. Its usefulness would seem to be explained by the fact of its complete digestibility and absorption.

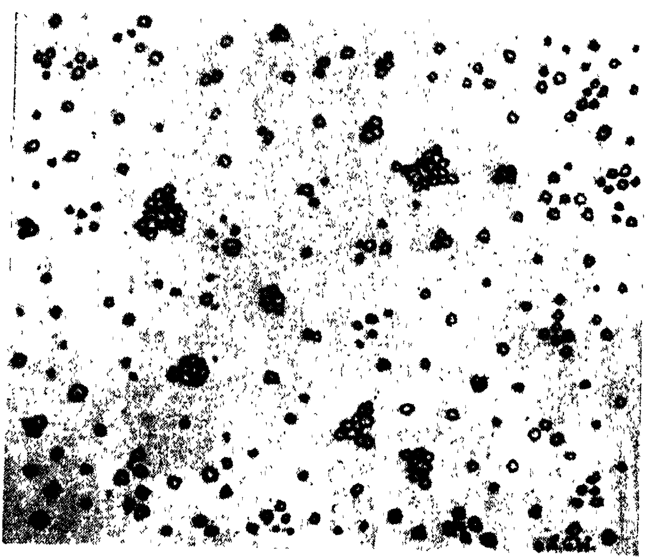

Fig. 2.—Starch of C. antiquorum or taro.

The Starch.

Microscopic examination was made side by side with other known starches with the result that the granule of colocasia was found to be as small as that of any other known starch. These observations are being published in detail elsewhere. In the literature dealing with starches there appears to be an almost complete neglect of the starch grains of taro or colocasia. It receives no mention, for example, in the detailed treatment of starch in two standard works such as Thorpe's *Dictionary of Applied Chemistry* and Allen's *Commercial Organic Analysis*. At 340 diameters the starch grains of taro, mounted in water, are just visible.

Under higher magnification (840 diameters), the larger grains appear definitely spheroidal or polygonal, with hilum central and minute, and appearing as a spot, with no rings visible. A typical microscopic field at this magnification is shown in Fig. 2. Both individual and compound granules were observed, the former frequently being in motion and the latter disintegrating in part into simple granules on mechanically manipulating the cover slip.

The microscopic appearance of the field was suggestive of pepper starch rather than of rice, both of which exhibit very small granules and are grouped together in Class V according to Muter's classification of starches. The size of the starch granules of colocasia was found to vary between 1 and 5 μ. Irrigation with dilute iodine solution gave the characteristic effect.

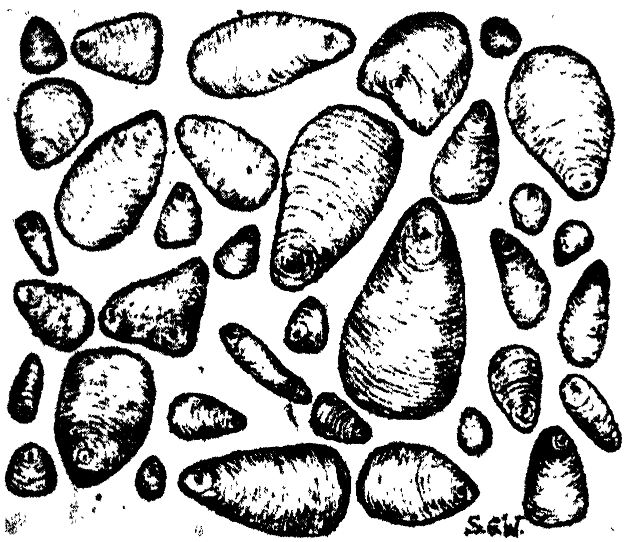

Fig. 3.—Starch of Canna edulis or Tous les Mois.

The granules of *Colocasia antiquorum* Schott are then simply characterized by their shape and minuteness, and these are the only diagnostic characters. It is noteworthy that the starch granules of other species of the arum family are quite different from those of colocasia, although in the two species examined the starch exhibited no characteristic differences between themselves. Thus the starch of *A. hygrophilum* was suggestive of cassava starch, but smaller, the typical grains being rounded at one end and truncated at the other, with excentric hilum. It is noteworthy that varieties of Canna edulis (*Tous les Mois*) are grown all over the Island as a garden plant with attractive flowers ranging in shade from yellow to red. It seemed, therefore, worth while to examine specimens of this tuber starch by way of comparison. The typical ovate granules, rounded at one end, and more or less pointed at the other, near which is situated the circular hilum, are shown in Fig. 3, at a magnification of about 500. The striations are seen to be well-marked, fine, regular, and incomplete ; dilute alkali develops the hilum and rings.

These are the largest starch grains known so that in Figs. 2 and 3 we have examples of the largest and the smallest starch grains known, the former ranging from approximately 45 μ. to 130 μ. *Cf.* Allen (21). Langworthy and Deuel (22) have shown that the raw starch of the taro tuber is completely digestible when humans are employed in the experimental tests.

Gelatinization Points.

It is well known that when starch is brought into contact with hot water, the granules, owing to the absorption of water, swell up greatly, and at different temperatures varying according to the kind of starch examined, ultimately rupture forming the familiar viscous liquid known as " starch paste." The use of a crude starch or the presence of impurity raises the required temperature for complete gelatinization, or the gelatinization point, as it is known. The thermal action is progressive, the younger later-formed granules swell up and burst first while the older earlier-formed granules are the last to change. Although the gelatinization point has been suggested as a criterion for the recognition of the many different varieties of starch, owing to the difficulty of controlling the experimental conditions, the method is too uncertain to be reliable. For the purpose of comparison, however, the gelatinization points have been re-determined for the starch of colocasia, St. Vincent arrowroot, Tous les Mois, potato and maize, the remaining data being taken from Auden (23) (Table 5).

TABLE 5.—GELATINIZATION POINT OF DIFFERENT STARCHES.

Origin of Starch	*Temperature of Complete Gelatinization.*
—	*Degree Cent.*
Colocasia Antiquorum, Schott	66
Arum maculatum	62.5
Arum esculentum	68.7
Maranta arundinacea (St. Vincent)	70
Canna edulis (Tous les Mois)	72
Potato	62.5
Maize	62.5
Wheat	67
Barley	62.5
Rice	61.2
Tapioca	68.7

Under ultra violet light the fresh-cut surface of colocasia exhibits scattered areas of a light sulphur yellow fluorescence which become canary yellow as the tuber progressively dries. Damaged tissue near the cortex gave a jade green fluorescence. The active constituent exciting the fluorescence has not been determined but it is not the starch.

Vitamins and Minerals.

Investigations on the vitamin content, principally by American workers, have shown that colocasia, or taro, cannot be regarded as a rich source of any of the vitamins (24). According to Miller(25), both taro and poi have a low content of vitamin A, rather more of the vitamin B complex, and are low in the antiscorbutic vitamin C and in vitamin D. They are rich in calcium.(12) Apart from this, there appears to be no very recent work on colocasia and a re-investigation of the vitamin content with the

quantitative methods now available would seem desirable. It is satisfactory to note that these problems are included in the research programme of the Hawaii Agricultural Experimental Station, Honolulu, which is the centre for taro research.

Acid and Alkaline Balance.

It has already been said that the ash of colocasia, in common with that of most other roots and tubers, vegetables, fruits and nuts, is of alkaline reaction. This is a fact of great importance in nutrition as will appear in the sequel. The cereals and proteins (which include meat, fish, game, eggs, etc.), on the other hand, yield an ash of acid reaction in digestion. Here it should be mentioned that the custom of referring to the ash or mineral matter of a food is misleading and incorrect ([26]). The ash of any foodstuff always consists of a mixture of the compounds of different elements, and each element has its own functions and significance in nutrition. It is thus well known that elements so closely related chemically as sodium and potassium, or for example, calcium and magnesium, are not only not interchangeable but are, in some of their functions, directly antagonistic in their action in the body. Hence the necessity of considering the relative, as well as the absolute, quantities of the different inorganic elements of the food.

One of the most significant of these relationships is that subsisting between the acid-forming and the base-forming elements because upon this depends very largely the state of neutrality of the body fluids. The normal reaction of human blood is faintly alkaline to litmus and varies within the narrow limits of pH 7 to pH 7.8. The normal processes of metabolism involve a continual production in the cells of "volatile" acids, such as CO_2, and "fixed" acids, such as H_2SO_4, which must be promptly disposed of or neutralized. The different mechanisms, whereby the body secures such neutralization and the maintenance of the state of neutrality of the tissues, have been well summarized by Professor Sherman ([26]) :—

> "This neutralization is in fact effected, partly by the amphoteric proteins abundant in all body cells, partly by ammonia formed from the deaminization of proteins and amino acids, and notably by the 'buffer' action of the mixtures of phosphates and carbonates together with hæmoglobin. . . . The blood possesses a number of buffers of which four require consideration from the point of view of this study : (1) the plasma proteins, which, like proteins generally, are amphoteric ; (2) carbonic acid and the carbonates, existing chiefly in the plasma ; (3) the phosphates, in both the plasma and the corpuscles ; (4) hæmoglobin and its compounds in the red corpuscles of the blood. All these except the last are as abundant and as important in the protoplasm as in the blood. . . . . Thus while the phosphates and carbonates of the blood and tissues serve for the immediate neutralization of acid without appreciable change in the normal reaction of the blood or tissue itself, yet when much strong acid such as the sulphuric acid from protein metabolism is neutralized in this way, there is apt to result an increased output of the base-forming elements, which if not made good by the intake must tend to diminish the 'reserve alkalinity' or 'alkali reserve' of the body."

Experiment has shown that foods having a basic reaction after burning in the body increase the alkali reserve as indicated by the increase in CO_2-tension of the alveolar (expired) air ; while conversely foods having an acid reaction through the lowered CO_2-tension of the alveolar air indicate a depletion of the alkali reserve. In the benefit to health generally resulting from a free use of foods such as fruits, vegetables, and milk products in the diet an important part may be claimed for the fact that these foods yield ash of alkaline reaction to the body.

Roots v. *Cereals.*

Starch, which is the chief natural energy food of man, is supplied from two main sources— roots and tubers (including stems, rhizomes, etc.), and seeds (cereals). As already stated the root starches generally have an alkaline reaction in nutrition and the cereal starches an acid reaction. Since the well-being of the body is so intimately dependant on the state of alkalinity of the blood and tissues, this fact supplies a strong argument in favour of the use of tuber starch, such as colocasia and potato, rather than of cereal starch in modern diets. As Ettie A. Hornibrook([27]) has shown, native man appears to have relied on roots much more than cereals for his energy food and so cultivated the main starch roots such as taro, maranta, cassava, sweet potato, giant bracken-root, etc. Cereals, which have also formed part of human diets from the earliest times, were first germinated by the more developed native races, as in the making of native beers, before cooking and eating. As civilization advanced so the cultivation of the more valuable starch roots has declined in the course of thousands of years, until now civilized man relies mainly on wheat, barley, oast, rye, rice, and maize, with the potato and colocasia of merely secondary importance. Recently Jones ([28]) has advocated the use of taro and sweet potato in the diet in preference to the grain foods because of their excess alkalinity.

Digestion of Starch.

It is obvious that the germinated cereal starch of native man was in a quite different condition from that consumed by civilized man. From the point of view of digestion the essential characteristic of the raw starch cell, whether root or cereal, is the fine wall of cellulose with which it is surrounded and which must be broken down before the cell contents can become available for nutrition. The human digestive system cannot deal satisfactorily with raw starch so that in modern practice the starch is boiled and is thus more or less hydrated. But native man regarded this boiling or steaming as insufficient and he developed the ground oven, as in North America, Polynesia, and New Zealand. In these ovens the starch foods were first hydrated completely, under pressure, and as the wet heat changed to dry they were dextrinized in one continuous process. Details of the process are set out in Hornibook's paper and in Stewart's Journal (1828) ([29]) as it applies to taro and poi, but cannot be discussed here. With energy supplied in this form native populations were free from the digestive disorders of civilization. In fact as Barrett ([8]) observes, in the Kanaka language of poi-eating Polynesia, there is no word for indigestion. Poi was considered to be of great nutritive value not only to the healthy and robust, but also to infants and invalids, being readily digested and non-irritating.

In addition to aiding digestion, the dextrinization of starches makes them more palatable, as for example the extra sweetness of properly baked potatoes, because the changes involved produce sugar-like bodies. This principle is finding constantly extended applications : in food factories dealing with the preparation of energy foods, in the use of cooked maize as feed for farm animals, and in the animal experiments of the laboratory. In the latter case it has been found that dextrinization of the starchy matter of the synthetic diet has led to better growth and well-being of the animals concerned. On the other hand, it is general experience that, when the carbohydrate is supplied by raw starch, the animals become pot-bellied, exhibit a distended intestine often filled with gas, and poor muscular tone. The application of this knowledge to man seems justified and indicates that the consumption of improperly cooked starch is a factor in the production of the distended abdomen characteristic of civilized man, a condition strikingly absent when the condition of primitive man, fed on dextrinized starch foods, is considered.([27])

Nutrition and Public Health.

Only a cursory glance can be given, in conclusion, to this most important aspect of public health which everywhere continues to attract increasing attention. The great error in the modern diet of overloading it with cereal starch, and sometimes sugar as well, is typical again of the average Cypriot diet. It is not surprising, therefore, to find the physical condition, described in the previous paragraph, present on all sides. Apart from this imbalance between the energy and the protein there seems to be a considerable section of the rural population who through poverty are underfed and here the incidence of affections such as tuberculosis, influenza, eye diseases, infections, and debility is high. Attention to the dietetic needs of this section of the community might well lead to the amelioration of some local economic problems by increased production of foodstuffs by agriculture.

The absence of the dramatic deficiency diseases such as rickets, beri-beri, scurvy, and pellagra might lead to the view that all is well with the average Cypriot dietary, but a closer scrutiny of its make-up shows it to be faulty. This is not surprising in view of the fact that a country with as high a standard of life as the United Kingdom reckons that from 20 to 30 per cent. of her population are suffering from some form of mal-nutrition. No scientific dietary surveys in Cyprus have as yet been made so that exact data are lacking. But there can be no doubt that qualitative as well as quantitative deficiencies in Cypriot diets have played their part in the general low resistance to infection, especially to pneumococci, staphylococci and streptococci. Whether the diseases of heavy incidence such as diabetes, the anæmias, cancer, rheumatic affections, gastric and duodenal ulcer, etc., have a nidus in faulty nutrition remain fruitful problems for investigation.

Finally, it must be remembered that although good food products exist in Cyprus, the food of the majority is often badly conserved, and adulterated. There is at present little conception of the importance of well-balanced nutrition in relation to health and disease and the fundamental conclusions of the research of the last 30 years have hardly penetrated to the local professional or layman.([30]) There is, therefore, great need for the extension of sound knowledge in the elementary matters

of food and nutrition and for active research on staple food products along well-planned lines. The present study of the staple energy-food, colocasia, has been undertaken by the Government Laboratory as an effort along these lines.

It is a pleasure to record my thanks to the Director of Medical Services for his interest and support in this investigation, to the Director of Agriculture for kindly affording me facilities, and to Mr. L. C. Haralambides, Assistant Analyst, for skilled assistance in the experimental work.

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A Brief Review of Tree Planting in the 1935–36 Planting Season.

ALTHOUGH the number of trees planted in the Tree Planting Areas is considerably less than that of the previous season, trees planted in areas other than declared tree planting areas exceed the number planted in the 1934–35 season by over 200,000 trees. This indicates clearly that Cypriot farmers now realize the benefits to be derived from tree planting.

Since the enactment of the Licensing of Shepherds' Law tree planting has been done with more confidence than in the past and as the lawless shepherds are gradually brought under control, tree planting will steadily increase every year.

There were 51 areas declared under the Tree Planting Law during the planting season of 1935–36 which with the 47 previously declared areas brings the total reserved areas in the whole Island up to 98.

The existing tree planting areas in each district are given below:—

TREE PLANTING VILLAGE AREAS LAWS, 1930–36.

Nicosia District.

1. Vizakia
2. Orounda
3. Kato Kopia
4. Akacha
5. Arghaki.
6. Peristerona.
7. Mitsero.
8. Episkopio.
9. Platanistasa.
10. Morphou.
11. Paleokhorio.
12. Pera.
13. Dhali.
14. Paleokhorio (Dagh).
15. Pera Khorio.
16. Ayios Epiphanios
17. Korakou.
18. Aradhiou.
19. Potami.
20. Alona
21. Kalopanayiotis.
22. Ambelikou.
23. Lymbia.
24. Alambra.
25. Kambi.

Famagusta District.

1. Lefkoniko.
2. Paralimni.

Limassol District.

1. Ayios Ioannis.
2. Ayios Mamas.
3. Pelendria.
4. Pissouri.
5. Agros.
6. Kividhes.
7. Phasoula.
8. Mandria
9. Perapedhi.
10. Kapilio.
11. Dhoros.
12. Lania.
13. Limnatis.
14. Apsiou.
15. Ayios Athanasios.
16. Alekhtora.
17. Monagri.
18. Yerasa.
19. Ayios Amvrosios.
20. Ayios Therapon.
21. Kilani.
22. Silikou.
23. Pakhna.
24. Moniatis.
25. Vouni.
26. Phini.
27. Sykopetra.
28. Ayios Theodhoros.
29. Omodhos.
30. Ypsonas.
31. Kyperounda.
32. Agridhia
33. Pentakomo.

Paphos District.

1. Ayios Photios.
2. Letymbou.
3. Galataria.
4. Stroumbi.
5. Kathikas.
6. Pendalia.
7. Statos.
8. Kelokedhara.
9. Pano Panayia.
10. Ayios Ioannis.
11. Polis.
12. Arminou.
13. Ayios Nikolaos.
14. Mesana.
15. Amarketi.
16. Kilinia.
17. Nata.
18. Khoulou.
19. Pretori.
20. Timi.
21. Kallepia.
22. Peristerona.
23. Kedhares.

Larnaca District.

1. Athienou.
2. Aradhippou.
3. Kato Dhrys.
4. Lefkara, Pano.
5. Lefkara, Kato.
6. Kivisil.
7. Mazotos.
8. Odhou.
9. Alethriko.
10. Kalavasos.

Kyrenia District.

1. Kazaphani.
2. Sisklipos.
3. Photta.
4. Asomatos.
5. Kormakiti.

The statements published on pp. 113 and 114 gives the number and kind of trees planted in the various areas of the Island in 1935–36.

It is observed from this statement that the most popular tree in both Tree Planting and non-reserved areas was again this season the almond. 176,790 almond trees have been planted in Tree Planting Areas and 216,425 in non-reserved areas. Forest trees come second in popularity followed by olive, carobs, vines, apricots, etc.

It is gratifying to mention that in some districts, clubs of the "Friends of the Tree" are established. The objects of these clubs are the promotion of tree planting in their districts.

School Gardens also played an important part in the movement for tree planting by providing seedlings and grafted trees to the planters at very low prices.

In a number of villages progress in tree planting is mainly due to the encouraging efforts of the village schoolmasters.

Since the reorganization of the Agricultural Department and stationing of itinerant Agricultural Assistants in 24 different sub-stations throughout the Island it has been possible for the Department of Agriculture to take a more active interest in stimulating tree planting activities.

Publications Reviewed.

PLANT BREEDING ABSTRACTS.—SUPPLEMENT II.

THE Imperial Bureau of Plant Genetics (for crops other than herbage) have published a supplement to Plant Breeding Abstracts. This supplement is a summary of the Annual Reports received at the Bureau from Stations in the British Empire during 1932–35. The supplement summarizes the work on plant breeding and related topics in the British Empire and the publication is a useful form of reference. The chief source of information has been the Annual Reports of the various Colonial Departments of Agriculture and the different Institutions and other bodies concerned with Agricultural Research in the Empire. Every Annual Report of this nature may not be received by the Bureau, therefore, the supplement cannot be considered as complete picture of plant breeding and related work carried out in the British Empire. The publication has, however, involved the scrutiny of over 400 reports and it may, therefore, justly be considered as an invaluable and comprehensive review to practical plant breeders.

The work reported upon includes plant breeding, genetics and cytology. There is also a section on the genetics of plant parasites, and an extensive index.

Advice for Wine Making of the Vintage, 1936.

WITH a defective vintage, as is the case of this year, the various elements of the grape will constitute a favourable medium for the development of bad ferments or microbes, which will influence badly the quality of the wine in general (taste and colour) and more particularly its keeping qualities.

The vintage has been affected seriously by hot winds, heat waves and still more by fungus, such as oidium and peronospora. Under these conditions special care in the making of wine is necessary, otherwise there is serious risk of a great part of the crop becoming unsound or unkeepable wines, good only for distilling.

Prevention is better than cure and in the case of wine nothing or very little can be done when once the wine goes wrong.

The measures to be taken to produce sound wines under conditions such as now prevail are as follows :—

(*a*) As far as possible, make white or rosy wines from red grapes, so as to avoid the fermentation of the juice in the presence of the skins and stocks. If the wine is made in the presence of the skins, any affected grapes must be carefully separated.

(*b*) Reduce the time of fermentation in the presence of the skins and stocks ; that is to say, do not wait for the end of the fermentation to separate the juice from the stocks and skins. A fermentation in their presence, should not last more than 3–4 days more especially if the weather during the wine-making period is very hot.

(*c*) Sulphur dioxide in the form of potassium metabisulphite, should be added to the vintage before the fermentation starts, at the rate of 15 drams per load of wine to be obtained or 5 drams per load of grapes (60 okes) crushed.

(*d*) It is advisable to prepare from healthy and well-ripened grapes a selected yeast, which should be added in the proportion of 2–3 % to the vintage before any fermentation starts.

(*e*) The wine should be racked as soon as it becomes clear and frequent rackings of this wine with addition of 2–3 drams of potassium metabisulphite per load of wine, are necessary, during the year, so as to keep the wine in good condition.

More than the usual care and cleanliness which are always required in a proper wine making is required that is to say :—

(1) Lime washing of the walls and floor of the cellar.

(2) Burning of sulphur in the proportion of 15 drams per cubic metre of capacity, after closing doors, windows and any holes in the cellar, for disinfection.

(3) All the vessels and instruments, which will be used with the grapes or the wine must be thoroughly cleaned and disinfected with a 10 % solution of carbonate of potash and then with abundant clean water.

(4) Wine vessels (jars, vats or casks) should be disinfected with burning sulphur.

Preparation of Selected Yeast.

(*a*) Fill with fresh must a cask or jar to which is added, before any fermentation starts, 20–25 drams of potassium metabisulphite, per load.

(*b*) Heat 6–8 kouzes of fresh must to a temperature of about 70°–75° Celsius ; pour this into a jar and cool it to 30° ; at this moment put into the sterilized must, 2–3 okes of grapes, which have been selected in the vineyard with every care so as to be healthy, clean and ripe and have been transported without having been touched by the fingers.

(*c*) The fermentation will start 8–10 hours ; during this time maintain the temperature of the must at about 30° ; *this is an essential condition.*

(*d*) When the fermentation is proceeding vigorously, add ½ to 1 kouze of the must which was treated with 20–25 drams, of potassium metabisulphite (*a*) and which is not fermenting ; repeat the same after ½ or 1 hour and so on.

(*e*) This prepared yeast is put into the vintage, when it enters the cellar and is placed in the jars or vats sulphured with 15 drams of potassiun metabisulphite per load, a proportion of 2–3 %.

(*f*) The jar with the selected yeast should be fed always with highly sulphured must from (*a*).

TREES PLANTED IN 1935-36 (OTHER THAN TREE PLANTING AREAS).

District or Sub-District	Vines donums	Citrus donums	Almonds No.	Carobs No.	Olives No.	Apples No.	Plums No.	Apricots No.	Peaches No.	Cherries No.	Pears No.	Quinces No.	Walnuts No.	Loquats No.	Forest No.	Figs No.	Other Fruit trees No.
Limassol	369	1,908	21,530	—	480	100	350	600	—	—	300	200	1,000	—	24,180	—	—
Ktima	70	14	1,610	770	55	—	—	—	—	—	—	—	—	—	—	—	—
Nicosia	—	64	27,000	—	3,000	—	—	3,000	—	—	—	—	—	—	7,000	2,000	5,500
Kyrenia	—	80	1,600	—	900	—	—	1,500	—	—	—	—	—	—	—	—	2,100
Larnaca	149	100	5,100	700	1.390	240	40	390	—	—	—	—	—	—	100 (dons.)	170	—
Trikoukkia ..	—	—	—	—	—	2.800	2,200	3,800	—	3.000	1.750	—	—	—	—	—	—
Lefka	503	100	32,675	300	2,954	840	40	2,065	—	40	64	330	100	—	3.722	696	1.375
Polis	216	63	42,600	170	1,190	—	—	—	—	—	—	—	—	—	—	—	370
Stroumbi ..	108	1	6,850	—	550	—	—	—	—	—	—	—	—	—	—	—	80
Yeroskipos ..	219	9	7,500	140	536	—	—	—	—	—	—	—	—	—	—	—	20
Ay. Amvrosios ..	580	1	9,550	—	50	—	—	—	—	—	—	—	—	—	—	—	376
Lefkara	593	100	23,800	370	1.610	190	40	1,850	—	250	220	—	—	—	—	—	—
Agros	347	3	12,590	—	430	1,115	726	921	590	170	650	520	641	—	—	—	—
Nisou	225	40	5,030	—	1,326	—	—	370	—	—	—	—	—	—	—	6,950	—
Famagusta ..	334	850	18,990	4.720	7,650	—	—	—	—	—	—	—	—	—	125,605 & 42 dons.	—	7,210
Total	3,713	3,333	216,425	7,170	22,121	5,285	3,396	14,496	590	3,460	2,984	1,050	1,741	—	160,507 & 142 dons.	9,816	17,031

Total number of trees (other than vines and citrus) planted other than in Tree Planting Areas	466,072
Vines donums	3,713
Citrus donums	3,333
Forest donums	142

TREES PLANTED IN 1935-36 (TREE PLANTING AREAS).

District or Sub-District	Vines donums	Citrus donums	Almonds No.	Carobs No.	Olives No.	Apples No.	Pears No.	Plums No.	Apricots No.	Peaches No.	Cherries No.	Walnuts No.	Loquats No.	Forest No.	Figs No.	Other Fruit trees No.	Quinces No.
Limassol	140	250	29,300	—	—	150	100	—	300	—	—	1,050	—	600	—	—	150
Nicosia	—	86	—	8,000	200	—	—	—	50	—	—	—	—	500	600	200	—
Kazaphani ..	—	—	400	—	100	—	—	—	—	—	—	—	—	—	—	—	—
Sisklipos	10	—	1,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Larnaca	—	—	6,000	1,200	—	—	—	—	—	—	—	—	—	100 (dons.)	—	—	—
Trikoukkia ..	—	—	13,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ambelikou ..	100	—	15,570	—	100	—	—	—	—	—	—	—	—	—	160	55	—
Polis	22	—	10,000	—	300	—	—	—	—	—	—	—	—	—	—	—	—
Stroumbi ..	74	—	—	—	290	—	—	—	—	—	—	—	—	—	—	130	—
Yeroskipos ..	40	532	12,500	—	350	—	—	—	—	—	—	—	—	—	—	—	—
Ay. Amvrosios ..	177	50	24,200	—	—	—	—	—	—	—	—	—	—	—	—	1,317	—
Lefkara	154	240	5,400	—	200	130	200	—	200	—	—	—	—	—	—	—	—
Agros	344	—	28,130	—	100	930	515	593	495	690	230	840	—	—	—	—	340
Nisou	70	—	25,500	800	165	—	—	—	—	—	—	—	—	11,000	—	—	—
Lefkoniko ..	14	—	3,790	—	500	—	—	—	—	—	—	—	—	3,247	—	100	—
Paralimni ..	—	—	—	—	—	—	—	—	—	—	—	—	—	5 (dons.)	—	—	—
Korakou	10	—	2,000	—	—	100	40	—	—	—	—	—	—	—	50	20	15
Total	1,155	1,158	176,790	10,000	2,305	1,310	855	593	1,045	690	230	1,890	—	15,347 & 105 dons.	810	1,822	505

Total number of trees planted in Tree Planting Areas (other than vines and citrus) ..	214,192
Vines donums	1,155
Citrus donums	1,158
Miscellaneous Forest trees donums	105

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All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

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The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

The Horse Breeding Law, 1930.

LIST OF STALLIONS LICENSED FOR 1936.

NICOSIA DISTRICT.

Village		*Owner's name*		*Reg. No.*
Akaki	..	Michael Th. Rafti	..	29
do.	..	Elias M. Tsinga	..	203
Argaki	..	Polyvios Theophani	..	153
Astromeritis	..	Christoforos Evangeli	..	26
Elea	..	Rejeb Ahmed	..	254
Kalokhorio	..	Yioryis Papaconstantinou	..	262
Kochati	..	Halil Mehmed	..	264
Lefka	..	Yiangos G. Boyiadji	..	20
Lymbia	..	Andronikos Petri	..	32
do.	..	Kyr. Constantinou	..	33
Mammari	..	Sotiris Ioannou	..	206
Morphou	..	Vasilis T. Spanos	..	18
do.	..	Andreas Ahapittas	..	249
Nicosia	..	Haji Costas Haji Panayi	..	62
Philia	..	Towlis Haralambou	..	255
Xeri	..	Theoris Constanti Menikioti	..	247
Yeri	..	Yeoryos Petri	..	16
Yerolakkos	..	Haralambos Sophokli	..	194
do.	..	Hj. Michael Hj. Loi	..	35

LARNACA DISTRICT.

Alaminos	..	Salih Jumaa	..	64
Aradhippou	..	Costis Kyriakou	..	15
do.	..	Lefteris Towli	..	225
do.	..	Gregoris Sava	..	261
Athienou	..	Yiangos N. Kalapodha	..	22
do.	..	Haris Antoni	..	66
do.	..	Costas N. Haji Vrashimi	..	96
do.	..	Vasilis M. Phiakou	..	159
Kophinou	..	Hussein Handji Ibrahim	..	209
Larnaca	..	Vasilis Demetri	..	43
Voroklini	..	Panayis Theodosi	..	106
do.	..	Haral. A. Chapoulis	..	220

FAMAGUSTA DISTRICT.

Akanthou	..	Yiannis Hambi	..	270
Angastina	..	Gavriel G. Kamenou	..	260
Asha	..	Antonis Michael	..	92
do.	..	Demetris Kounallis	..	208
do.	..	Christos Haji Lavithi	..	234
do.	..	Kyriakos Antoni	..	239

Village		*Owner's name*		*Reg. No.*
—		—		—
Ayios Andronikos	..	Spyros Yeoryi	..	65
do.	..	Christofis Hambi	..	240
Ayios Elias	..	Constantis Stylli	..	246
do.	..	Yeorgios Christodoulou	..	265
Ayios Seryios	..	Antonis S. Gizas	..	68
Ephtakomi	..	Loizos Hambaka	..	219
Famagusta	..	Ibrahim Mehmet Kallika	..	211
Galatia	..	Akil Mustafa Gonie	..	54
Kalopsidha	..	Yeoryios Antoniou	..	267
Komi Kebir	..	Kyriakos Antoniou	..	48
do.	..	Christodoulos K. Sphongos	..	101
Kondea	..	Theocharis Alexandrou	..	193
do.	..	Christos Hanni	..	259
Lefkoniko	..	Mehmed Salih	..	38
do.	..	Christos Haji Symeou	..	41
Leonarisso	..	Chrysanthos Panayi	..	56
Lysi	..	Minas Lysandrou	..	80
do.	..	Artemis Haji Constandoura	..	227
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ROBERT J. ROE,
Chief Veterinary Officer,
Inspector of Horse Breeding.

30th September, 1936.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

JUNE, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fell
Nicosia District :							
Nicosia	89.30	63.14	0.25	1	0.25	0.16	
Athalassa			0.57	2	0.53	0.11	
Morphou	89.15	61.33				0.03	
Makhæras						0.42	
Famagusta District :							
Famagusta	89.47	66.07				0.18	
Akhyritou	87.50	63.20				0.18	
Rizokarpaso ...						0.02	
Lefkoniko			0.37	2	0.35	0.23	
Larnaca District :							
Larnaca	89.00	63.00	0.23	2	0.22	0.02	
Lefkara						0.13	
Limassol District :							
Limassol	85.91	62.17	0.08	1	0.08	0.06	
Saittas						0.61	
Trikoukkia						0.39	
Alekhtora						0.006	
Paphos District :							
Paphos						0.05	
Polis...						0.005	
Kyrenia District :							
Kyrenia	81.60	66.00				0.04	
JULY, 1936.							
Nicosia District :							
Nicosia	97.23	71.03				0.07	—
Athalassa			—				
Morphou	94.77	67.45					
Makhaeras						0.08	—
Famagusta District :							
Famagusta	95.32	75.39				—	
Akhyritou	92.70	69.70				—	
Rizokarpaso ...						—	
Lefkoniko ...			0.58	1	0.58	0.01	
Larnaca District :							
Larnaca	97.00	67.00					—
Lefkara							
Limassol District :							
Limassol	90.34	67.35			—	—	
Saittas	—					0.27	
Trikoukkia	81.17	60.78				0.11	
Alekhtora	—					0.13	
Paphos District :							
Paphos		—			—		
Polis...			—	—			
Kyrenia District :							
Kyrenia	88.38	72.16					—

Note.—Compiled from returns furnished by Public Works Department

AUGUST, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fell
Nicosia District :							
Nicosia	97.00	70.78	-	—	—	0.09	-
Athalassa	-	—	—	—		0.04	
Morphou	97.45	68.61			—		
Makhæras	-	—		—			
Famagusta District :							
Famagusta	97.35	72.97		-			
Akhyritou	94.60	71.10					-
Rizokarpaso ...		—			-	—	—
Lefkoniko		-	0.07	1	0.07	0.09	
Larnaca District :							
Larnaca	95.00	69.00				—	
Lefkara					-	-	-
Limassol District :							
Limassol	92.32	69.87			-		-
Saittas					—	0.07	
Trikoukkia... ...			0.80	2	0.50	0.09	—
Alekhtora							
Paphos District :							
Paphos						—	
Polis...				—		0.01	
Kyrenia District :							
Kyrenia	93.12	72.30					

Note.—Compiled from returns furnished by Public Works Department.

Department of Agriculture, Cyprus.

HEADQUARTERS—NICOSIA.

ALL general correspondence should be addressed to the Director of Agriculture.

Correspondence and applications for advice referring to the Veterinary, Entomological, Mycological or Chemical Branches, should be addressed to the Officer in charge of the Branch. When seeking advice in regard to treatment of plant pests or diseases, specimens should, whenever possible, be sent.

GOVERNMENT STOCK FARM, ATHALASSA AND DISTRICT STUD STABLES.

Applications for services of stud animals at Athalassa or the supply of live stock, poultry, eggs, etc., should be addressed to the Manager, Stock Farm, Athalassa. Applications for services of stud animals at District Stud Stables should be made to the Stud Groom in charge. There are Stud Stables at Famagusta, Vatili, Rizokarpaso, Ayios Theodhoros, Lefkoniko, Larnaca, Limassol, Paphos and Polis.

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The Saraclo—a village-made implement for levelling a field after sowing.

The Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXXI, Part 4 DECEMBER, 1936 Price 3cp.

EDITORIAL NOTES

AGRICULTURAL SITUATION.

THE absence of rain until the end of November was giving cause for anxiety among several farmers but all fears of drought are, for the time being, dispelled. During the end of November and early in December most Districts have had excellent rain and the planting of cereals is taking place under satisfactory conditions.

Owing to the exhaustion of natural dry pastures during November, heavy mortality was caused among grazing flocks through under-nourishment.

* * * * * * *

WHEAT, FLOUR AND BREAD.

In 1933 the price of imported flour was so low that locally-produced millable wheat could not be marketed even at 3*s.* per kilé In order to protect the local wheat-growing industry, restrictions were placed on imported flour so as to maintain a remunerative price for Cyprus wheat and yet allow the sale of a cheap loaf to the consumer.

Such conditions continued until this year when the situation was completely reversed owing to circumstances entirely beyond local control. The average price of imported flour in October this year rose to £14. 4*s.* 4*p.* per ton as compared with £11. 13*s.* 3*p.* per ton in October last year. The price of local wheat has soared to 7*s.* 4¼*p.* per kilé, stocks are scarce and the price of bread has risen. In order to reduce, to some extent, the price of bread a part of the duty on imported flour was removed. Local prices for wheat, flour and bread are governed, to a large extent, by world prices but there has been a tendency to exploit the local market by not releasing stocks while prices were high. The importation of cheap wheat from neighbouring countries and use of substitutes in bread-making have had some effect in controlling the price for local wheat, while the market adjusts itself to the new conditions.

* * * * * * *

SEED DISINFECTION.

Increasing interest is being shown by farmers in the disinfection of seed corn. Machines for the treatment of seed can be had on loan from the Department and instruction given in their use.

Seed treatment should be carried out as a matter of routine now that the whole process has been much simplified by the introduction of dusts which replace the older wet methods.

The covered smut of barley can be controlled by dusting the grain with ordinary dusting sulphur at the rate of 37½ drams to one kilé of seed. Wheat should be treated with copper carbonate at the rate of 18 drams to the kilé. This chemical controls the covered or stinking smut of wheat and considerably reduces the leaf smut.

* * * * * * *

ORANGE PICKING.

Growers and packers of citrus fruit are reminded that wastage in transit can be very largely prevented. It has already been demonstrated by the Department that wastage is, in the first place, almost entirely due to careless handling of the fruit at picking and during the subsequent operations. Special care should be taken not to bruise the fruit with the clippers and the stalk should always be cut twice to ensure that there is no projecting piece that might injure the fruit in the picking baskets.

Cyprus is one of the few countries where pickers and packers do not wear gloves. If these are not used the finger nails, especially the thumb nails, of all who handle the fruit should be kept short. Little progress can be expected as long as picking is done haphazardly by any casual labour in the grove. Much of the trouble would be eliminated if the crop was bought on the tree and picked by a skilled gang under the constant supervision of a skilled foreman. Such a gang would soon become expert and all fruit exported from one packing house would have received uniform treatment.

The wilting of the fruit should receive more careful an attention. It should be arranged not more than two or three fruits deep on raised platforms with adequate bottom ventilation. In the packing shed care should be taken that all rotten fruit, peel and other debris is cleared away daily and either buried or burnt.

* * * * * * *

CITRUS EXPORTS.

The export of citrus fruits since the commencement of the season to the end of November, 1936, constitute a record over any previous similar period.

The following is a comparative statement of shipments made up to the 30th November for the years 1935 and 1936 :—

QUANTITIES EXPORTED

Year	Oranges		Lemons		Bitter Oranges		Sweet Lemons		Grapefruit		Mandarins	
	bxs.	bkts.	bxs.	bkts.	bxs.	bkts.	bxs.	bkts.	bxs.	bkts.	bxs.	bkts.
1935	37,508	810	21,642	411	314	—	—	19	—	—	—	—
1936	127,209	108	31,313	152	437	—	—	—	331	—	187	—

The exports to the United Kingdom for the last two years during the above period were :—

Year	Oranges boxes	Lemons boxes	Bitter Oranges boxes	Grapefruit boxes	Mandarins Boxes
1935	16,946	20,827	314	—	—
1936	76,505	29,805	437	299	137

Exports to Norway and Sweden were 8,208 boxes and 2,979 boxes respectively in 1935 as compared with 25,370 boxes and 12,490 boxes respectively in 1936.

* * * * * * *

LEMON DAY AT LAPITHOS.

A " Lemon Day " was organized at Lapithos on the afternoon of Wednesday, 11th November, 1936. Mr. A. Panaretos, Agricultural Officer, Famagusta, gave an address about lemon-growing and the Registrar, Co-operative Credit Societies, spoke on the subject of co-operative marketing.

* * * * * * *

AGRICULTURAL SHOWS.

Three Shows were held during the autumn.

A three-day Agricultural and Industrial Exhibition was held at Ktima on the 3rd, 4th and 5th October, for Paphos District. The Exhibition was opened by His Excellency the Governor. This Show received considerable response from the Agricultural communities of Paphos District and was a pronounced success. In connection with this Show, competitions for standing crops were held and it is hoped that this feature may be extended to other Shows in the future.

The second Annual Village Show of Athienou was held on the 15th November for cereal and animals only. There was keen competition in both classes and a large number of exhibitors participated in the classes for animals.

An Agricultural Show organized by the Kyrenia Municipal Corporation was held at Kyrenia on the 21st and 22nd November. The Show was opened by His Excellency the Governor. His Excellency was welcomed by the Mayor of Kyrenia, Mr. Fieros, and the Show was declared open before a large gathering of Kyrenia residents and visitors from other Districts.

* * * * * * *

LIVE-STOCK NOTES.

The live-stock for the Government Stock Farm, purchased with the grant from the Colonial Development Fund arrived early in October.

The Irish draft stallion " Kildare Guard " is 3 years old, grey, and a particularly fine horse. He is now stationed at Athalassa. The Dales pony stallion is 6 years old and is destined for the Paphos District where another Dales pony stallion was kept from 1923 to 1928.

The Kerry bull and dairy Shorthorn cattle have been added to the herd at Athalassa. The four heifers were all in calf, the first one being due to calve in January. They have excellent pedigree records, many of the animals in their pedigrees having won first prizes at important Shows in England. The dairy Shorthorn bull "Chalfield Minstrel 2nd" was third in his class at the Royal Show at Bristol this year.

It has now become possible to place the other Shorthorn bull, " Ilord Ambassador 5th " in Nicosia for use among the many dairy cows kept in the town.

An auction sale was held at Athalassa on the 27th November when surplus stock was sold, realizing the following prices :—

Stock Sold	*Average Price* £	s.	p.
—	£	s.	p.
9 bullocks and one bull	3	12	2
2 barren Shorthorn cows	8	5	4½
1 jack donkey	2	18	0
6 cross-bred sheep, 4 lambs and 1 native ram	–	13	8
3 cross-bred lambs	–	9	8
3 goats	–	14	7
2 kids	–	5	0
3 sows	2	5	0
31 young pigs	–	5	7
29 head of poultry	–	2	4
4 turkeys	–	7	8

Total realized : £85. 8*s*. 6*p*.

The Thoroughbred stallion "Moleskin" has been issued on loan at Nisou to travel in that district. Two other stallions are to be issued on loan at Limassol and Evdhimou as this secures a wider distribution than is otherwise possible, since there are now 11 Government-owned stallions in the Island. One stallion "Mazarin" has had to be destroyed after 13 years' service in the Island.

* * * * * * *

CYPRUS SHIPPERS' ASSOCIATION.

A Meeting of the Council of the Cyprus Shippers' Association was held at Famagusta on the 16th November, 1936, when the position of the formation of the proposed Cyprus Citrus Exporters Association as a sub-section of the Cyprus Shippers' Association was discussed.

As no satisfactory decision could be arrived at in regard to organizing the Citrus Shippers the following resolution was passed :—

> "That no further meetings of the Council should be held until the next General Meeting of the members of the Association and that the Chairman and Secretary thereof be authorized to carry out the ordinary work of the Association."

The General Meeting will be held early next year when the future of the Association will be considered.

* * * * * * *

AGRICULTURAL ADVISORY COMMITTEE.

A meeting of the Agricultural Committee was held on Saturday, 5th December, 1936, in the Office of the Director of Agriculture at 10 a.m. and the following agenda discussed :—

(*a*) Seed Corn Loans.
(*b*) Price of Bread.
(*c*) Import Duties on Flour.
(*d*) Valuation of Immovable Properties.
(*e*) Postponement of Foreclosures.
(*f*) Rate of Interest.
(*g*) Borings for underground water.
(*h*) Improvement of Cotton Growing.
(*i*) Compulsory Tree Planting.
(*j*) Provision of Work for Poor People.

Injurious Insects of Cyprus.

BY H. M. MORRIS, M.Sc., F.R.E.S., *Government Entomologist, Cyprus.*

[*Continued from September issue.*]

DIPTERA :

CECIDOMYIDÆ :

Asphondylia gennadii, March. (Carob Midge), causes very considerable damage to carob pods ("Brachycarpia" disease). Eggs are laid in the flowers or young pods in the autumn and the larvæ feed inside the pods in the winter. In the early spring the attacked pods remain small and become misshapen while healthy pods are growing rapidly. The pupal stage occurs inside the pod and the pupæ subsequently project from the pods and the adults then emerge from about the end of April into June. There are at least two further generations in the young carob pods during the summer and autumn.

Asphondylia capsici, Barnes.—This species attacks the fruit of *Capsicum annuum* which the larvæ cause to be misshapen and stunted.

Asynapta fucifer, Barnes.—The larvæ of this species occur fairly commonly in olive fruit. Olives damaged by *Dacus oleæ* or other causes are probably preferred but sound olives may also be attacked.

Dasyneura oleæ, F. Lw., causes galls on the leaves of olives.

Mayetiola destructor, Say. (Hessian Fly).—This insect appears to be generally distributed in the Island and sometimes causes very considerable damage to wheat and barley in the spring. It appears on the whole that earlier sown crops are most liable to attack, but owing to the irregular occurrence of the first rain in the autumn it is not possible to indicate safe sowing dates as can be done elsewhere.

PSYCHODIDÆ :

Phlebotomus minutus, Rond.

Phlebotomus papatasii, Scop.—"Sandflies" are very troublesome throughout all except the higher parts of the Island during the summer, and these two species have so far been identified.

CULICIDÆ :

A full account of the anopheline mosquitoes of Cyprus has been published(1) and lists are also given in that publication of the Culicines.

Culex pipiens, L., occurs very commonly.

Aëdes argentatus, Poir., is also a common species.

Theobaldia longiareolata, Mcq., is also a common species.

Anopheles superpictus, Grassi, appears to be the commonest anopheline. (*Pyretophorus palestinensis* recorded by Williamson(2) = *A. superpictus*).

Other species of Culicines and Anophelines are known to occur, including *A. bifurcatus*, L., *A. hyrcanus*, Pall., *A. sacharovi*, Favr., (*elutus*, Edw.), and *A. algeriensis*, Theo.

SIMULIDÆ :

Simulium equinum, L. and *S. aureum*, Fries., have been taken.

Flies belonging to this family are sometimes troublesome in the spring.

(1) Aziz, M. *The Anopheline Mosquitoes of Cyprus*, Health Department Papers No. IV, Cyprus, 1934.

(2) Williamson, G. A., *Biting Flies* "Addendum to the Report of the Commission appointed to enquire into the working of irrigation reservoirs in the Mesaoria," Cyprus, 1909, pp. 11–12.

CHIRONOMIDÆ :

"Midges" belonging to this family are very troublesome in the spring in some areas.

TABANIDÆ :

Chrysops (*Heterochrysops*) *italica*, Meig., is stated to occur.

Chrysops perspicillaris, Lw.—Recorded by Williamson (1).

Chrysops punctifera, Lw. and *Tabanus autumnalis*, L., are fairly common in some places.

Other species belonging to this family have also been obtained but are not yet identified.

TRYPETIDÆ :

Acidia heraclei, L. (Celery Fly), has been bred from larvæ mining in celery leaves.

Ceratitis capitata, Wied. (Mediterranean Fruit Fly).—This insect is very destructive to many kinds of fruit throughout all the lower parts of the Island. Its attacks are most troublesome on citrus fruit, mandarins and thin-skinned oranges being particularly attacked. In the winter the development of the insect is much delayed by the cold weather but citrus fruit remaining on the trees in the spring is severely attacked. Black mulberry, pear and peach appear to be preferred fruits during the summer, but this insect is unable to survive the severe winter in the mountains where most pear, apple and peach growing occurs and therefore it is not a serious pest of these fruits except in the lower areas.

The common practice of growing one or two apricot, fig or other fruit trees in citrus plantations creates conditions very favourable to the multiplication of *Ceratitis*, as does also the neglect of fallen and over-ripe fruit, in which it is often allowed to breed freely in neglected plantations.

Dacus oleæ, Mg. (Olive Fly).—This destructive pest of the olive fruit occurs throughout the Island wherever olives are grown, and also attacks the fruit of the wild olive trees growing on the mountains. The adult female punctures the skin and lays her eggs in the flesh of the fruit, where the larvæ feed and tunnel. The pupa appears usually to be formed in the fruit, the larva first making its way outwards until only enclosed by the skin of the fruit and the adult on emerging from the pupa breaks through the skin at this point. There are several generations during the year and the attack on olives collected from the trees late in the season, in November and December, is usually very severe, while in most years there is a considerable attack by September.

Myiopardalis pardalina, Big.—An occasional pest of melons, in the fruit of which the larvæ tunnel.

LONCHÆIDÆ :

Lonchæa aurea, Macq. (*splendida*, Lœw), bred from cotton bolls from which *Platyedra* and *Earias* were also bred. Also bred from melons.

Lonchæa chorea, F. (*vaginalis*, Fall.), has been bred from larvæ in figs.

DROSOPHILIDÆ :

Drosophila melanogaster, Mg. (*ampelophila*, Lw.), bred from figs, mandarins, pears, pomegranates, tomatoes and berries of *Cratægus azarolus*. Probably only over-ripe or damaged fruit is attacked.

Gitona beckeri, Duda. (*distans*, Bezzi), bred from cotton bolls and from figs.

(1) Williamson, G. A., *Biting Flies* "Addendum to the Report of the Commission appointed to enquire into the working of irrigation reservoirs in the Mesaoria," Cyprus. 1909, pp. 11–12.

EPHYDRIDÆ :

Hydrellia griseola, Hn., bred from larvæ mining in the leaves of barley, occurring abundantly on one occasion in a small area.

SEPSIDÆ :

Piophila casei, Fln., has been bred from locally cured ham.

GEOMYZIDÆ :

Balioptera tripunctuta, Hn., whose larvæ attack the shoots of graminaceous plants, has been taken but no damage due to its attacks has been recorded.

ANTHOMYIDÆ :

Chortophila (*Delia*) sp., bred from larvæ causing destruction of melon seeds in the ground after sowing.

MUSCIDÆ :

Musca domestica, L. (House Fly).—Very abundant everywhere.

Stomoxys calcitrans, Geoff. (Biting House Fly, Stable Fly).—Abundant everywhere.

Muscina stabulans, Hn., bred from melons, and also from tomatoes attacked by *Heliothis obsoleta*, F.

CALLIPHORIDÆ :

Calliphora erythrocephala, Mg. (Blue Bottle Fly).—Rather common. Bred from larvæ in locally cured ham.

Chrysomyia albiceps, Wied., also occurs.

SARCOPHAGIDÆ :

Sarcophaga hæmorrhoidalis, Schim., bred from tomatoes from which *Heliothis obsoleta*, F., was also bred.

Sarcophaga destructor, Mall., bred from fallen apricots, potatoes and tomatoes with the previous species.

OESTRIDÆ :

A species of *Oestrus* believed to be new, has been taken and is believed to occur commonly.

Gastrophilus intestinalis, DeG. (Horse Bot Fly), has been taken and is believed to occur commonly.

Hypoderma æratum, Austin. (Goat Warble Fly).—The larvæ of this species are found very commonly on goats, often in large numbers, and occasionally on sheep. The adults appear particularly to choose kids for oviposition and larvæ are found much more abundantly in animals not yet a year old than in older animals.

HIPPOBOSCIDÆ :

Hippobosca equina, L., occurs commonly.

Hippobosca capensis, v. Olf.—Taken on dog.

HYMENOPTERA :

TENTHREDINIDÆ :

Two or three species have been taken in small numbers but no damage due to them has been recorded.

SIRICIDÆ :

Sirex noctilio, F.—A number of specimens were bred from larvæ in pine logs on one occasion. They were parasitized by the Cynipid, *Ibalia leucospoides*, Hoch.

FORMICIDÆ (Ants) :

One species, not yet identified, occasionally causes damage to orange trees by eating the leaves.

CHALCIDÆ :

Eurytoma amygdali, End. (Almond Wasp), is a very common pest of almonds. The eggs are laid in or on the young soft almonds, which the larvæ enter on hatching, feeding inside the kernel during the summer and autumn, and they remain full grown inside the shrivelled kernel during the winter to pupate there in the spring. The adults leave the almonds in the spring by cutting a hole through the shell. Attacked almonds frequently turn black and remain firmly attached to the twigs throughout the winter.

This insect also attacks apricots and caishas in a similar manner, when the attacked fruit becomes dry and black but does not as frequently remain firmly attached to the twigs in the winter as in the case of almonds.

MUTILLIDÆ :

Several species belonging to this family occur and the apterous females are frequently seen. Species recorded are *Tropidotilla syriaca*, André, *Myrmilla erythrocephala*, Latr., *Dasylabris maura*, L., and *Pycnotylla barbara*, var. *calva*, L. The females are known locally as "sphalangi" and are greatly feared owing to their being believed to transmit Anthrax by their bite.

VESPIDÆ :

Vespa germanica, Ltr. (Wasp), occurs commonly and is said to have been introduced into the Island some years ago in hopes of reducing the numbers of flies.

Vespa orientalis, F. (Hornet), occurs commonly and is a considerable pest of various kinds of fruit, especially grapes, and also of bee-hives. It nests usually in holes in walls or amongst loose stones, but also nests in the ground.

MEGACHILIDÆ :

Several species of leaf-cutting bees occur and cause a certain amount of damage at times by cutting pieces out of the leaves of almonds, roses, etc., for the construction of their cells.

ACARINA :

ERIOPHYIDÆ :

Eriophyes cladophthirus, Nalepa.—Recorded once causing damage to potato leaves.

Eriophyes granati, Can. and Massal.—A pest of pomegranate trees, sometimes very abundant and causing a considerable amount of defoliation.

Eriophyes pyri, Pagst.—Taken damaging the buds of apple trees.

Eriophyes sp.—Attacking walnut leaves, causing numerous patches of matted hairs on the leaves similar to those on the vine known as "Erinose," and due to the next species.

Phyllocoptes vitis, Nalepa.—Occurs frequently on vine leaves causing the development of patches of matted hairs on the under side of the leaves and corresponding raised areas on the upper side and known as "Erinose." The hairs are at first whitish but later in the season become brown, and in cases of severe attack an appreciable proportion of the leaf surface may be affected, but ordinarily the attack is probably unimportant.

INJURIOUS INSECTS CLASSIFIED BY HOST PLANTS.

ALMOND :
Jassid.
Lachnus persicæ, Burn.
Hyalopterus arundinis, F.
Myelois ceratoniæ, Zell.
Epicrocis anthracanthes, Meyrick.
Clytra atraphaxides, Pall.
Gynandrophthalma limbata, Stev.
Anthonomus cyprius, Marshall.
Lixus algirus, L.
Scolytus amygdali, Guer.
Epicometis hirta, Poda.
Oxythyrea abigail, Rche.
Adoretus pullus, Baudi.
Eurytoma amygdali, End.
Megachilidæ.

"AMERICAN BLACKBERRY" :
Haltica ciliciensis, Weise.

APPLE :
Stephanitis pyri, F.
Jassid.
Doralis pomi, Deg.
Dentatus roseus, Baker.
Parlatoria oleæ, Colv.
Parlatoria pergandii, Comst.
Zeuzera pyrina, L.
Hyponomeuta padellus, L.
Cydia pomonella, L.
Olethreuthes (*Argyroploce*) *pruniana*, Hb.
Schistocerus bimaculatus, Ol.
Anthonomus pomorum, L.
Scolytus amygdali, Guer.
Eriophyes pyri, Pagst.

APRICOT AND CAISHA :
Anarsia lineatella, Zell.
Recurvaria nanella, Hb.
Olethreuthes (*Argyroploce*) *pruniana*, Hb.
Ptosima undecimmaculata, Hbst.
Scolytus amygdali, Guer.
Ceratitis capitata, Wied.
Eurytoma amygdali, End.

ARTICHOKE :
Pyrameis cardui, L.
Sphæroderma testaceum, F.
Podagrica malvæ, Ill.
Cassida ?palestina, Rch.
Lixus lutescens, Cap.

ASPARAGUS :
Crioceris bicruciata, Sahlb.

BARLEY (see also "Cereals") :
Mayetiola destructor, Say.
Hydrellia griseola, Hn.

BEANS :
Dolycoris baccarum, L.
Aphis rumicis, L.
Phytometra gamma, L.
Ocnogyna lœwi, Zell.
Lixus sp.
Sitona lineata, L.
Sitona limosa, Rossi.

CABBAGE :
Brevicoryne brassicæ, L.
Plutella maculipennis, Curt.
Hellula undalis, F.
Pieris brassicæ, L.
Pieris rapæ, L.

CAROB :
Chrysomphalus aurantii, Mask.
Aspidiotus hederæ, Vallot.
Aspidiotus britannicus, Newst.
Lecanium elongatum, Sign.
Lepidosaphes ulmi, L.
Myelois ceratoniæ, Zell.
Cerambyx heros, Scop.
Asphondylia gennadii, March.

CARROT :
Papilio machaon, L.

CAULIFLOWER :
Brevicoryne brassicæ, L.
Plutella maculipennis, Curt.
Hellula undalis, F.
Pieris brassicæ, L.
Pieris rapæ, L.
Phyllotreta cruciferæ, Gœze.

CELERY :
Acidia heraclei, L.

CEREALS (see also "Wheat and Barley") :
Dociostaurus maroccanus, Thnb.
Dolycoris baccarum, L.
Syringopais (*Scythris*) *temperatella*, Led.
Lema melanopa, L.

CHERRY :
Dolycoris baccarum, L.
Anarsia lineatella, Zell.
Eugonia polychloros, L.
Scolytus rugulosus, Ratz.

CITRUS (see also separate varieties):
Stenozygum coloratum, Kl.
Toxoptera aurantiæ, B.d.F.
Chrysomphalus aurantii, Mask.
Aspidiotus lataniæ, Sign.
Lecanium hesperidum, L.
Pseudococcus citri, Risso.
Lepidosaphes beckii, Newm.
Ceroplastes floridensis, Comst.
Icerya purchasi, Mask.
Charaxes jasius, L.
Chiloneus brevithorax, Desbr.
Ceratitis capitata, Wied.

COTTON:
Calliptamus italicus, L.
Tettigonia viridissima, L.
Decticus albifrons, Serv.
Aphis gossypii, Glov.
Platyedra gossypiella, Saund.
Earias insulana, Bois.
Sibinia planiuscula, Desbr
Gitona beckeri, Duda.

CRATAGUS AZAROLUS
Ceroplastes rusci, L.
Drosophila melanogaster, Mg.

CYPRESS:
Chionaspis striata. Newst.
Phlæosinus armatus, Reitt.

DATE:
Coccotrypes dactyliperda, F.

FIG:
Ceroplastes rusci, L
Lepidosaphes ficus, var. *nicosiæ*, Green.
Ceratitis capitata, Wied.
Lonchæa chorea, F. (*vaginalis*, Fall.).
Drosophila melanogaster, Mg.
Gitona beckeri, Duda.

FLAX:
Aphthona euphorbiæ, Schrank.
Longitarsus parvulus, Payk.

FRUIT (see also separate varieties):
Dolycoris baccarum, L.
Cicada orni, L.
Parlatoria oleæ, Colv.
Parlatoria zizyphi, Lucas.
Zeuzera pyrina, L.
Cerambyx velutinus, Brull.
Chlorophorus varius, Mull.
Scolytus rugulosus, Ratz.
Scolytus amygdali, Guer.
Ceratitis capitata, Wied.
Vespa orientalis, F.

LEMON (see also "Citrus"):
Chrysomphalus aurantii, Mask.
Parlatoria zizyphi, Lucas.

LOQUAT:
Parlatoria oleæ, Colv.
Scolytus rugulosus, Ratz.

MAIZE:
Heliothis (*Chloridea*) *obsoleta*, F.
Cirphis ?loreyi, Dup.

MANDARIN (see also "Citrus"):
Ceratitis capitata, Wied.
Drosophila melanogaster. Mg.

MELON:
Thrips tobaci, Lind.
Aphis gossypii, Glov.
Epilachna chrysomelina, F.
Tenebrionid larvæ.
Rhaphidopalpa foveicollis, Kust.
Temnorhynchus baal, Rche.
Myiopardalis pardalina, Big.
Lonchæa aurea, Macq. (*splendida*, Lœw.)
Chortophila (*Delia*) sp.

MPAMIA (Hibiscus esculentus):
Earias insulana, Bois.
Podagrica malvæ, Ill.

MULBERRY:
Chrysomphalus aurantii, Mask.
Lecanium persicæ, Geoff.
Ceratitis capitata, Wied. (on black mulberry).

OLIVE:
Schistocerca gregaria, Forsk.
Euphyllura olivina, Costa.
Aleurolobus olivinus, Silvestri.
Lecanium (*Saissetia*) *oleæ*, Bern.
Leucodiaspis riccæ, T.T.
Pollinia pollini, Costa.
Prays oleella, Fabr.
Zeuzera pyrina, L.
Margaronia (*Glyphodes*) *unionalis*, Hb.
Omophlus propagatus, Kirsch.
Rhynchitis ruber, Fairm.
Phlæotribus oleæ, F.
Phlæotribus caucasicus, Reitt.
Asynapta fucifer, *Barnes*.
Dasyneura oleæ, F. Lw.
Dacus oleæ, Mg.

ORANGE (see also "Citrus"):
Ceroplastes rusci, L.
Lepidosaphes beckii, Newm
Papilio machaon, L.
Podagrica malvæ, Ill.
Lixus algirus, L.
Epicometis hirta, Poda.
Ceratitis capitata, Wied.

ORNAMENTAL PLANTS:
Chionaspis striata, Newst. (on *Thuya*).
Galeatus scrophicus, Saund. (on chrysanthemum).
Acherontia atropos, L. (on *Datura*).
Deilephila livornica, Esp. (on *Linaria*).
Chærocampa alecto, L. (on virginia creeper).
Clytra nigrocincta, Lac. var. (on turpentine tree, *Pistachia* sp.)
Phyllotreta corrugata, Rehe. (on stocks and wallflowers).
Baris timida, Rossi. (on hollyhock).
Epicometis hirta, Poda. (on flowers and tree seedlings).
Oxythyrea abigail, Rehe. (on flowers).

PEA:
Dolycoris baccarum, L.

PEACH:
Lachnus persicæ, Burn.
Hyalopterus arundinis, F.
Parlatoria oleæ, Colv.
Anarsia lineatella, Zell.
Recurvaria nanella, Hb.
Cydia pomonella, L.
Anthonomus cyprius, Marshall.
Lixus algirus, L.
Ceratitis capitata, Wied.

PEAR:
Stephanitis pyri, F.
Cydia pomonella, L.
Eugonia polychloros, L.
Anthonomus pomorum, L.
Protætia cuprea, F.
Adoretus pullus, Baudi.
Ceratitis capitata, Wied.
Drosophila melanogaster, Mg.

PEPPER (Capsicum annuum):
Asphondylia capsici, Barnes.

PINE:
Leucaspis knemion, Hoke.
Leucaspis pusilla, Lœw.
Thaumetopœa wilkinsoni, Tams.
Hypophlœus fraxini, Kugel.
Pogonochœrus perroudi, Muls.
Ips erosus, Wol.
Ips (*Pityogenes*) *porifrons*, Eggers.
Myelophilus piniperda, L.
Sirex noctilio, F.

PLANE:
Rhesus serricollis, Mots.

PLUM:
Lachnus persicæ, Burn.
Hyponomeuta padellus, L.
Cydia pomonella, L.
Olethreutes (*Argyroploce*) *pruniana*, Hb.
Scolytus amygdali, Guer.

POMEGRANATE:
Aleurotrachelus cyprusi, Dozier.
Doralis punicæ, Pass.
Lepidosaphes conchiformis, Gmel.
Zeuzera pyrina, L.
Niphona picticornis, Muls.
Drosophila melanogaster, Mg.
Eriophyes granati, Can. & Massal.

POTATO:
Dolycoris baccarum, L.
Eurydema festiva, L.
Phthorimæa operculella, Zell.
Phlyctænia fulvalis, Hb.
Laphygma exigua, Hb.
Prodenia litura, F.
Acherontia atropos, L.
Tenebrionid larvæ.
Eriophyes cladophthirus, Nalepa.

QUINCE:
Lecanium (*Saissetia*) *oleæ*, Bern.
Cydia pomonella, L.

ROSE:
Chrysomphalus aurantii, Mask.
Adoretus pullus, Baudi.
Megachilidæ.

SORGHUM:
Cirphis ?loreyi, Dup.

SPINACH-BEET:
Sitona oculata, Küst.

TORED PRODUCTS :
Sitotroga cerealella, Ol.
Ephestia elutella, Hb.
Ephestia kühniella, Zell.
Ephestia afflatella, Mn.
Ephestia cautella, Wlk.
Myelois ceratoniæ, Zell.
Pyralis farinalis, L.
Sterrha herburiata, F. var.
Galleria mellonella, L.
Tenebroides mauritanicus, L.
Carpophilus hemipterus, L.
Carpophilus dimidiatus, F.
Silvanus surinamensis, L.
Anthrenus verbasci, L.
Attagenus bifasciatus, Ol.
Trogoderma versicolor, Creutz.
Lasioderma serricorne, F.
Ptinus fur, L.
Rhizopertha dominica, F.
Triboleum castaneum, Hbst.
Triboleum confusum, Duv.
Bruchus dentipes, Bdi.
Bruchus lentis, Fröb.
Bruchus chinensis, L.
Bruchus rufimanus, Ksh.
Bruchus analis, F.
Calandra granaria, L.
Calandra oryzæ, Hn.
Piophila casei, Hn.

TOBACCO :
Tettigonia viridissima, L.
Decticus albifrons, Serv.
Opatroides punctulatus, Brull.
Zophosis punctata, Brull.

TOMATO :
Laphygma exigua, Hb.
Heliothis (*Chloridea*) *obsoleta*, F.
Phytometra chalcytes, Esp.
Drosophila melanogaster, Mg. (*ampelophila*, Lw.).

VEGETABLES, General :
Schistocerca gregaria, Forsk.
Tridactylus variegatus, Latr.
Liogryllus bimaculatus, Deg.
Nezara viridula, L.

VINE :
Schistocerca gregaria, Forsk.
Termites.
Cryptothrips brevicollis, Bagnall.
Dolycoris baccarum, L.
Targionia vitis, Sign.
Polychrosis botrana, Schiff.
Zygæna (*Theresia*) *ampelophaga*, Bayle.
Deilephila livornica, Esp.
Chærocampa alecto, L.
Omophlus propagatus, Kirsch.
Psalidium aurigerum, Desbr.
Epicometis hirta, Poda.
Vespa orientalis, F.
Phyllocoptes vitis, Nalepa.

WALNUT :
Chromaphis juglandis, Gœtze.
Cydia pomonella, L.
Cerambyx heros, Scop.
Eriophyes, sp.

WATTLE (*Acacia* sp.) :
Aspidiotus hederæ, Vallot.

WHEAT (see also "Cereals") :
Dolycoris baccarum, L.
Epicometes hirta, Poda.
Oxythyrea abigail, Rche.
Mayetiola destructor, Say.

Diseases of Sheep and Goats.

With Special Reference to Cyprus.

BY R. MOYLAN GAMBLES, *Veterinary Officer.*

INTRODUCTORY.

THE raising of sheep and goats is an important industry in Cyprus, and large numbers of villagers rely entirely on them for their livelihood. There are about three quarters of a million sheep and goats in the Island, seven times as many as all the other domesticated animals put together. The health of the flocks is, therefore, a matter of the greatest importance. There are three extremely serious diseases affecting these animals in Cyprus, viz.: Anthrax, Variola, and Parasitic Gastroenteritis. The first two of these are now more or less under control, and great progress is being made in controlling the third. There are also numbers of other diseases of lesser importance, and others which do not occur here, but would become serious scourges if they were accidentally introduced.

This article attempts to give a brief account of the various diseases affecting sheep and goats, calling special attention to those which occur in Cyprus, or would cause serious harm if they were to be introduced. It is divided into three parts The first, and most important, deals with the Contagious Diseases caused by Bacteria (or germs) and Viruses (living agents which are too small even to be seen with the microscope). The second deals with diseases caused by animal parasites, protozoa (or microscopic single-celled animals), worms of various kinds, and insects and ticks, etc. The third deals with various accidental, sporadic, and non-specific affections.

PART I.—DISEASES CAUSED BY BACTERIA AND VIRUSES.

ANTHRAX, (*Phlangara*).—The most important disease of sheep and goats in Cyprus is undoubtedly Anthrax, a disease which is also dangerous to most other animals, including man. Fifteen years ago about 10% of the flocks used to die annually from this disease, and in heavily affected areas, such as parts of the Paphos District, the Kyrenia Hills, and the Karpas, the mortality was often as high as 25–30%, and in some villages even up to 40%. Now, thanks to the Government's policy of compulsory vaccination, the disease is practically unknown among sheep, and only a few hundred goats are lost each year.

The disease is caused by a germ which is swallowed while the animal is grazing or drinking (and occasionally by other means), and then invades the blood. The course of the disease is normally very rapid, and death usually takes place ten minutes to two hours after the onset of visible symptoms, although the animal has been incubating the disease for some days, and has probably had a high temperature during part of that time. Sometimes the animal is found dead without its having been noticed to be ill at all. Occasionally the animal is ill for several days before it dies, but this is rare.

The animal stops following the flock, stands still, and trembles. It frequently walks round in circles. It soon falls down, and after a short struggle dies. There is frequently a discharge of bloodstained mucus from the nostrils (and sometimes from the anus) at the time of death.

If the animals live long enough, there may be a bloodstained Diarrhœa, or even bloodstained Urine The carcase becomes blown up after death much more rapidly than after most other diseases.

If the carcase is opened, the spleen will usually be seen to be swollen up and dark in colour, although it is sometimes normal in appearance. The intestines are usually deeply congested and reddened. The blood is usually dark in colour, and does not clot as readily as in the normal animal. But it is extremely dangerous to open any carcase where there is any possibility of Anthrax, and this should never be done in the case of any animal that dies suddenly. The disease can be diagnosed with certainty by microscopic examination of a drop of blood. Where the disease is suspected, an ear from a freshly dead animal should be forwarded to the Veterinary Laboratory. If the ear is tied tightly with string in two places close together, and cut off between them, little or no virulent blood will be spilled.

The disease is spread by spilling the blood of an infected animal. As long as the carcase is left whole, the germ is in the "vegetative" form, and if the carcase is buried, the germs soon die during the course of putrifaction. But if the infected blood is exposed to the air, the germs turn into another form, the "spore," which is extremely hard to kill, and remains a source of danger for many years. Spores are spilled over the pasture in millions every time an Anthrax carcase is skinned, or opened to see the cause of death. Sometimes shepherds slaughter sick animals, and the blood is spilled on the pastures, or even into a stream. By this means, spores are spread widely, and may cause the death of large numbers of animals drinking from it It is equally dangerous to leave carcases unburied, or buried not sufficiently deep to prevent dogs from digging them up. Dogs, vultures, and various insects which come to feed on the carcase spread the disease to a great extent. Flies may become contaminated and spread the disease by settling on wounds, and other insects may play a part in its transmission. The dog itself is not readily infected with Anthrax, but contaminates its mouth, chest, and paws with blood, and so infects the pastures over which it walks, and streams and fountains where it drinks. Vultures do not live in such close contact with the flocks as do dogs, but they probably play a still more important part in the spread of the disease. It is possible that the spores they swallow while feeding may pass through the bowel unchanged, making their droppings infective. This would account for the high incidence of the disease in the Kyrenia Hills, where most of the vultures nest. They feed on carcases both nearby and in the plains, and then return to their nests in the crags dropping virulent spores to be washed down by the rain to the areas used as pastures by the hill villages.

Enormous progress in the control of Anthrax has been made during the last fifteen years, but its complete eradication from the Island will still take many years, and can only be achieved through close co-operation between the Veterinary Service and the flock-owners. Losses among sheep can be entirely prevented by vaccination, but the immunization of goats is more difficult, and if a very heavy dose of Anthrax spores is picked up while grazing, even vaccinated goats may occasionally become infected, although never in the great numbers that were lost in the days before vaccination was introduced. Owners can help by

abstaining from slaughtering ill animals, and by properly disposing of all carcases, burying them deep, beyond the reach of dogs, and leaving the skin intact. Thus fresh infection of pastures will be prevented, and in time, the spores already present will die out.

SHEEP-POX AND GOAT-POX, (*Variola, Evloyia*).—These two diseases are distinct in that Sheep-Pox does not affect goats, nor Goat-Pox sheep. But the two diseases are identical in appearance, pass through the same stages, and the measures to be taken for the control of the disease are the same in either case, so they will be dealt with together.

The disease is caused by a virus, and infection is brought about by inhalation of dust contaminated by fallen scabs. The disease passes through five distinct stages. In the first (or preliminary) stage, there is a general febrile reaction, as the virus is absorbed through the lungs and bronchi, and circulates in the blood. The animal shows a high temperature, is dull, does not feed, and may have a cough. This stage lasts four or five days. In the second (or roseolar) stage, the virus settles down in the skin and produces red spots, mostly on the inside of the thighs, along the belly, on the udder, under the tail, and on the face, although any part of the body may be affected. It is at the end of this stage, or the beginning of the next, that most deaths occur from the disease. In the third (or vesicular) stage, vesicles appear in the red patches, filled with a clear and slightly yellowish fluid. In a very severe case of the disease, these vesicles may be so many, and so close to each other, that many of them will become joined together. The second and third stages together last about five or six days. In the fourth (or pustular) stage, the clear fluid in the vesicles becomes white and pus-like. This lasts four or five days. In the last (or scab) stage, the pustules have become dry scabs, and these fall off in about ten days, leaving a smooth round white scar underneath. If they are pulled off before they are ready to fall, they leave a moist dirty area, covered with dry pus. When all the scabs have fallen, the animals recover in a few days. In winter, many animals die during the scab stage, but in the summer, if the flocks are in good condition, animals that reach the scab stage usually survive. The total mortality, if the condition of the flocks is good, as in summer (except in drought years), does not usually exceed 5% of the total flock; but in winter, 15–20% or even more may die. Mortality is higher in neglected flocks than when they are cared for.

There is no actual treatment for the disease. Control measures consist of putting affected areas into quarantine. The disease is very contagious, and all the flocks in the quarantine area are likely to become infected before the area is free from the disease. Therefore, all non-affected animals in the area are vaccinated. There are two methods possible. The " ovination " method consists in carefully drawing off a little of the clear fluid from the vesicles of an animal in the third stage of the disease, and placing some of this greatly diluted with water on a patch of lightly scarified skin. This usually forms a localized infection, and the result is purely a skin disease, without the first stage, in which the virus circulates in the body. Thus the violent general reaction is avoided, and the animal is unlikely to suffer at all severely from the disease. There is always, however, a danger of a general infection being set up by ovination.

is, therefore, safer to use the other method, and apply a Laboratory-prepared Vaccine, in which the virus is weakened with boric acid, and is unable to cause a general reaction. The vaccinated animal is then certain of a very mild local attack of the disease, after which it will be immune, and saved from a much more severe natural attack.

CONTAGIOUS PUSTULAR DERMATITIS (*Infectious Labial Dermatitis, Scabby-Mouth, Anemevloyia*).—This is a very contagious disease affecting sheep and goats, and is very common in Cyprus. It is usually a mild disease, but if flocks are neglected it can cause considerable losses. Its chief importance lies in the possibility of confusion with a mild case of Pox. It is possible that the recent outbreaks of Sheep and Goat-Pox, after their supposed absence for many years, were not due to a fresh infection introduced from abroad, but that a few cases had been carrying on in a mild form, and were mistaken for Contagious Pustular Dermatitis. Then, during the drought, when all the animals were in very poor condition, the pox asserted itself, and assumed a highly virulent form, which swept over almost the whole Island.

Contagious Pustular Dermatitis is caused by a virus, and is purely a disease of the skin. There is no general reaction, as in Pox, and the temperature shows little or no rise above the normal. The lesions usually commence on the lips, as infection is taken up while grazing on contaminated pastures. Occasionally they commence on the feet, where they may cause lameness for one or two days. The disease can also be spread to the feet from the mouth, by the animals scratching at the lips with the feet. Lesions can also occur on the udder, usually from being sucked by infected kids. They are rare on other parts of the body.

The lesion commences as a small hard nodule in the skin, which passes rapidly into a crusty scab, which dies and falls off, from 5–20 days after its appearance. If lesions are actually inside the mouth, they may pass through a vesiculo-pustular stage. They often cause inconvenience while feeding, so that the animal appears to lose its appetite for a few days. But more often the animals are able to continue to feed normally. When the affected animals are unable to graze, they must be hand-fed. If this precaution is neglected, the animals will become weak, and so suffer much more severely from the disease. The chief danger with the disease is that the scabs may get torn off before they are ready to fall, either while the animal is feeding, or by scratching. A raw surface is left, and this may become infected with other organisms, or may be attacked by flies, and become filled with maggots. This can be prevented by dressing the lips, especially in animals where there is a raw surface, or any bleeding round the base of the scabs, with oil containing a small amount of carbolic and eucalyptus.

HÆMORRHAGIC SEPTICÆMIA.—On two occasions in Cyprus there have been outbreaks of disease which is suspected to have been Hæmorrhagic Septicæmia, although this was never confirmed by the Laboratory. Only sheep were affected.

The symptoms of the disease are a rise in temperature, Diarrhœa, which is sometimes bloodstained, and Pneumonia, which is shown by laboured and painful breathing. Sometimes a soft watery swelling is

noticed under the jaws. When the disease is present in a very acute form, death may take place before Pneumonia has had time to develop.

If the carcase is opened, numerous hæmorrhages will be noticed in the internal organs, spots of blood under the covering membranes. These are especially noticeable in the heart (both inside and out), the omentum, and the mesentery, with its associated lymph-glands The lungs will usually be greatly inflamed, with hæmorrhages, and often a marked thickening of the septa between the lobes The intestines frequently show patches of inflammation. The spleen is not enlarged as it frequently is in Anthrax. In its acutest form, when death is rapid, the disease may sometimes be confused with Anthrax, but the latter can always be distinguished by microscopic examination of the blood, if an ear from a freshly dead animal is submitted to the Laboratory.

The severity of the disease varies in different outbreaks, and is much more serious when the sheep are in poor condition, or suffering from other diseases (such as parasites) at the same time.

CONTAGIOUS ABORTION.—Large numbers of sheep and goats abort every year in Cyprus. This often due to the poor condition of the flocks, the result of insufficient food, or food of bad quality, or due to parasites, internal and external It is sometimes, however, due to contagious disease. There is one very serious form of Contagious Abortion affecting goats (and sometimes sheep) called Malta Fever. It is caused by a germ which is very closely related to that which causes Contagious Abortion in cattle. Malta Fever is particularly dangerous, as it can be transmitted to man, often with fatal results Man acquires the disease through drinking milk of an affected sheep or goat, and it takes the form which is called Undulant Fever. It is no longer known to exist in Cyprus. It was once introduced with some Maltese goats, but appears to have been successfully stamped out. There are two other kinds of Contagious Abortion affecting sheep, Vibrionic Abortion, which is not known to occur in Cyprus, and Salmonellar Abortion, which has been found here on several occasions It is not possible to say how common this disease is, because although fœtuses have frequently been sent to the Veterinary Laboratory, they have usually arrived in too putrified a condition for the cause of the abortion to be discovered.

The disease is spread by infected fœtal membranes, and by the discharges of the mother after abortion. It is, therefore, wise to isolate any animal that aborts, until all discharges have ceased, and the fœtus and all its membranes should be burnt immediately.

TETANUS ("*Lockjaw*").—This is mainly a disease of horses, but may affect almost any animal, and is quite common in sheep, and may also occur in goats. It is caused by a germ which lives in the soil and enters the body through wounds, *e.g.* through the navel of newborn lambs, or through the wounds caused by castration, or made while shearing. All such wounds should always be carefully disinfected. Iodine is the most potent disinfectant against this particular germ.

The germ multiplies in the wound, and forms a powerful poison which is absorbed and affects the nervous system. The first symptoms usually noticed are a difficulty in swallowing, and a protrusion of the third eyelid, which may almost cover the eye. There may be stiffness of the

neck, and also of the legs. Gradually whole groups of muscles become thrown into spasms. The jaw muscles are usually the first to become affected, and the jaws become firmly locked together. Soon the whole body is affected. In the commonest form of the disease, the head is thrown back, the back hollowed, and the limbs extended. Sometimes the head is thrown downwards and the back arched. Sometimes the body is curved sideways, but this is not common. Eventually, after much suffering, the animal dies of exhaustion. No lesions are seen at postmortem, other than the original wound where the germ entered the body.

Treatment is not advisable, as affected sheep scarcely ever recover. As soon as the spasms commence, and the animal becomes stiff, it suffers very great pain, and should be slaughtered at once, to end its misery.

BLACKQUARTER.—This is mainly a disease of cattle, but it can also affect sheep and goats, like Anthrax, it is caused by a germ which lives in the soil, and infection is spread by failure to dispose of carcases. In this disease, however, the germs are mainly confined to the local lesions, instead of being widespread through the body. Infection is usually through a wound, but this is not always visible, as it may have healed up before symptoms of the disease appear.

The first symptom of the disease is a high temperature, and if (as is often the case) the lesion is on one of the limbs, lameness is also an early symptom. Then a swelling appears, usually either near the shoulder or at the quarter. This turns dark red or black, and if touched, is found to crepitate, owing to the presence of much gas under the skin and in the muscle. Very similar types of swellings are caused by closely related germs, and are called by other names, such as " Malignant Oedema " and " Gas Gangrene."

Treatment is not advisable, for, affected animals seldom recover, and any incision into the wound will spread the infection. Carcases should be buried deep without skinning. On pastures where Blackquarter is common, animals can be protected by a special vaccine prepared against the disease.

ENTEROTOXÆMIA, ETC.—There is a group of diseases caused by germs closely related to those of Blackquarter and Malignant Oedema, which are usually referred to as the Enterotoxæmia group and cause heavy losses in some parts of the world. In these diseases (Braxy, Lamb-Dysentery, Strike, Black Disease, Pulpy Kidney, etc.), the germs do not infect a wound, or cause gas-containing swellings, but live in the intestines, and produce poisons which are absorbed, and set up the symptoms of the various diseases (frequently sudden death). It is possible that some of these diseases may occur in Cyprus, although none of them have been definitely recognized, if so, they are not common enough to do any serious harm.

TUBERCULOSIS.—Sheep are not often affected with this disease, and no case have ever been found in Cyprus. When sheep are affected, the lesions are usually in the lungs or neighbouring lymp-glands. Enlarged glands may press on the œsophagus, and interfere with the return of gases from the stomach, causing the animal to become blown,

JOHNE'S DISEASE.—This is mainly a disease of cattle, but sheep can also be affected. It does not, however, occur in Cyprus. The Intestines become thick and wrinkled, so that very little food can be absorbed. There is constant diarrhœa, which becomes steadily worse, and the animal becomes extremely thin and emaciated, and eventually dies.

CASEOUS LYMPHADENITIS.—This is a chronic disease of sheep, which causes serious losses in some parts of the world, and is caused by a germ which enters the body through wounds, and sets up cheesy abscesses in the lymph-glands in various parts of the body.

Affected animals do not thrive, and gradually grow more emaciated. The enlarged glands can be felt, and are often visible as large swellings, which are painless and hard. At post-mortem when the affected glands are cut open, they are found to contain large spherical masses of cheesy matter, which is often arranged in concentric layers, and in old lesions is often calcified.

The germ causing this disease, or a very similar one, was once found in a cheesy abscess in a sheep slaughtered in Famagusta, but no other cases are known to have occurred in Cyprus, and the disease is of no importance here.

ACTINOMYCOSIS AND ACTINOBACILLOSIS ("*Lumpy-jaw*" and "*Wooden-tongue*").—These are two diseases very similar to each other, caused by two closely related germs, and mainly affect cattle, although they are sometimes found in sheep. No case in sheep has been found in Cyprus, but as it occurs in cattle here, it is always possible for a sheep to become infected.

The germs enter through wounds in the alimentary canal, through the empty sockets when the teeth are changing, or carried into the tissues by grass-awns, or other pieces of sharp prickly plants. When no wounds are caused, they do not enter the tissues, and they are frequently present in the alimentary canal in large numbers, without doing any harm. But when they penetrate, they set up hard fibrous swellings containing small pockets of pus, in which are numerous small hard granules. As the pus is not all in one place, these cannot be opened up and drained like acute abscesses.

Various parts of the body are affected, but most commonly in or near the head. Actinomycosis usually affects the bones of the head which become spongy and swollen, and sometimes forms lesions in the liver. Actinobacillosis affects the tongue and the lymph-glands of the head and neck. When the tongue is affected, feeding becomes painful, and the animal stands with its mouth open, salivating freely. In the glands, the disease is just indicated by swellings.

Actinobacillosis can be cured, if taken early enough, by treating with small doses of potassium iodide or biniodide of Mercury. In Actinomycosis, the bony tissues of the jaw are altered in structure by the disease, so no drug can cure the condition, although treatment might prevent the condition becoming worse.

FOOT AND MOUTH DISEASE.—Cyprus has fortunately been free of the scourge for a great many years, and it is to be hoped that it never visits us again. Its chief danger lies in the fact that it is extremely contagious,

and accordingly spread exceedingly rapidly. Last time it occurred here (in 1917) it spread over the whole Island and probably nearly every animal was affected. The mortality from the disease is not high, but the animals lose condition greatly, and nearly all the females abort the following year. It, therefore, causes much more severe lose than diseases which are more fatal, but affect fewer animals.

The disease is caused by a virus, and affects mainly cattle, sheep, goats and pigs, although other animals and man can sometimes be affected. It is characterized by a sudden rise in temperature (more severe in sheep than in cattle), followed by the formation of vesicles full of clear watery fluid, in the mouth, and on the feet, occasionally on other parts of the body. In sheep, the feet are more severely affected than is usual in cattle, and the lesions in the mouth are fewer and smaller. In cattle the irritation in the mouth leads to profuse salivation, but this is frequently not noticed in sheep. Instead, they snap the jaws and grind the teeth. The animals also become lame, sheep more severely so than cattle.

The disease is very easily spread by contaminated foodstuffs and straw packing, etc., imported from abroad, so the danger of its suddenly appearing in Cyprus must always be borne in mind. Whenever the disease is suspected, it must be notified at once to the nearest Government Veterinary Officer, who will advise what measures are to be taken. No time must be wasted by an owner trying to treat the disease himself.

RINDERPEST (*Cattle-plague*).—This disease is caused by a virus, and mainly affects cattle, but may also affect sheep and goats. It occurs mainly in Africa and the Far East. It does not exist in Cyprus. It spreads very rapidly. Affected animals show a violent diarrhœa, with inflammation and ulceration of the whole alimentary tract, and often of the respiratory system as well. In a short time the animal becomes completely emaciated and is a mere bag of skin and bones. In sheep, the mortality is about 50%.

RABIES (*Hydrophobia*).—This is another virus disease that fortunately does not occur in Cyprus. It is mainly a disease of dogs, driving them mad, and killing them in a very short time. The disease is spread by the bite of the mad animal. Sheep, like every other animal, can be infected if bitten by a mad dog. An affected sheep becomes excited, stamps its feet, and attacks others in the flock. It soon becomes paralyzed, and dies in 3–5 days.

LOUPING ILL (*Trembling, Dizzy Shivers*).—This is another virus disease affecting the brain, and is spread by the bite of ticks. It has never been found in Cyprus. The affected animal falls down, struggles violently, and dies in a very short time. There are no lesions to be seen at post-mortem.

[*To be continued.*]

Broom Rape.

(*Orobanche* spp.)

BY R. M. NATTRASS, *Plant Pathologist.*

CULTIVATED plants are not only subject to diseases caused by fungi and bacteria but are also attacked by parasitic flowering plants. Of these, various species of Dodder (*Cuscuta*) are well known and obvious parasites and their habit of twining themselves round their victims and extracting nourishment from them can be easily seen. An account of the Flax Dodder which is typical of this family appeared in this *Journal*, Vol. XXIX, June, 1934.

In contrast to the Dodders which only attach themselves to the above ground parts of the attacked plants, are the various species of broom rape (*Orobanche* spp.) which attach themselves to the roots.

FIG. 1. Crop of Broad Beans severely attacked by Orobanche resulting in total loss of the crop.

The broom rapes are annuals and, in common with other parasitic plants, are leafless containing no chlorophyll or green colouring matter. There are several species in Cyprus and they attack a number of crop plants. The crop which suffers most severely is the broad bean which is attacked by one of the largest species, *Orobanche Crenata* Forsk., the large flowering spikes of which can easily be seen among the bean plants (Fig. 1). So severely is this crop sometimes attacked that the number of spikes occasionally outnumbers the bean plants and the crop is almost a complete loss.

The plant of *Orobanche* consists almost entirely of a thick flowering stem the base of which is scaly and becomes slightly tuberous. The flowers are numerous and may extend for 12 inches or more from the apex of the stem downwards. They are more or less bell shaped, whitish or flesh coloured and frequently striped with light purple. On approaching maturity the whole spike turns brown and the flowers become dry and papery.

The seeds, which are produced in many seeded capsules, are extremely small, being almost dust like, and measuring about ½ a millimetre or $\frac{1}{50}$ of an inch in length and rather less in breadth (Fig. 3). Many thousands of such seeds are produced from each flowering spike. So minute and light are these seeds that they are easily carried by the wind. The diagram shows the seeds of *Orobanche* compared with those of flax, tomato and cuscuta.

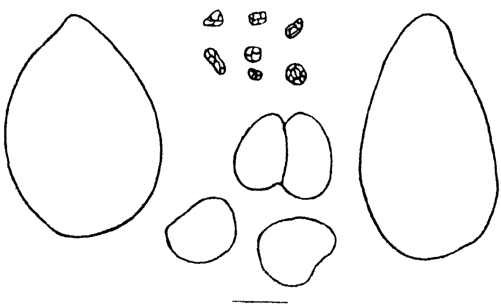

FIG. 3.—Seeds of Orobanche (*top centre*) compared with Tomato (*left*). Flax (*right*) and Dodder, all magnified × 10 approx.

The seeds of the broom rape only germinate on coming into contact with the roots of the plant on which they are parasitic. On germination the seedlings are at first thread-like resembling those of *Cuscuta*. The seedling then becomes attached to the roots of the bean by means of a sucker or haustorium and afterwards develops into a thick brownish shoot bearing the spike of flowers at the apex. These may attain a length of two feet or more. During the whole of its life it obtains nourishment at the expense of the bean plant—as can be seen in the illustration no leaves are produced (Fig. 2).

Control.—The broom rapes are annuals and can, therefore, only be reproduced by means of the seeds. As the seeds are so minute there is no danger of them being introduced with the seeds of any crop even if only moderately well screened. The seeds may, however, remain dormant in the soil for a considerable period and attack the same crop later in the rotation.

The flowers of the bean broom rape ripen their seeds earlier than the bean so that when the crop is harvested, the seeds are already scattered in the soil or disseminated by the wind. It can best be dealt with by extracting the plants before the flowers have set the seed. With the bean crop this can be done by hand and is well worth the labour spent. When the attack is particularly severe or occurs in small patches, the parasite should be dug up and burnt. It is, however, a waste of time

dealing with the pest if the flowers have once reached maturity. The common practice in Cyprus of harvesting the crop and leaving the broom rape standing is the surest way of propagating the parasite and rendering the land useless for a susceptible crop. To be of any value at all the spikes must be extracted as soon as they appear.

FIG. 2. Orobanche attached to the roots of a Broad Bean plant; the Orobanche possesses neither leaves nor roots.

If a crop of beans has been badly attacked they should not be grown on the same land again for as long an interval as possible. Only systematic hand pulling as often as the broom rape appears will rid the land of this parasite.

Sericultural Notes.

DEMONSTRATIONAL SILKWORM REARING IN GIRLS' SCHOOLS, 1936.

DEMONSTRATIONAL silkworm rearings have been carried out during 1936 in 127 Orthodox-Christian and 15 Moslem schools where approximately 1,850 girls attended the rearing and acquired a useful knowledge of sericulture. Twelve of these rearings failed wholly or partially owing to lack of care by the mistresses, or to accident.

The maximum production of cocoons was at the rate of 76 okes of cocoons per ounce of silkworm eggs and the average for the 130 successful rearings was at the rate of 46 okes per ounce of silkworm eggs; the average production for the Island is 24 okes 132 drams (1936).

The Agricultural College Old Students' Club Cup for the year 1936 has been awarded to the Girls' School of Mazotos (Schoolmistress Miss Phroso Nikolaou) which obtained the highest production of cocoons (76 okes of cocoons per ounce of silkworm eggs).

Prizes for 1936 were given by the Agricultural Department in co-operation with the Education Department to the following schoolmistresses:—

PRIZES OF £1 IN EACH DISTRICT.

Nicosia District.

Pera Khorio: Christina Michael.

Larnaca District.

Mazotos: Phroso Nikolaou.

Limassol District.

Episkopi (Orthodox-Christian) } 15s. each { Ioulia Voreadhou.
do. (Moslem) } { Zekhra Kiouzite.

Famagusta District.

Varosha: Anastasia Michaelidou, Irini Dhrymiotou, Ioanna Kolokasidou, Theano Andronikou, Niovi Griva, Elli Euthyvoulou.

Kyrenia District.

Kyrenia (Moslem): Zehra Ali Riza.

Paphos District.

Ktima (Moslem): Katriá Houloussi.

PRIZES OF 10s. EACH.

Nicosia District:	27 Schools.	*Famagusta District:*	21 Schools.
Larnaca District:	9 Schools.	*Paphos District:*	13 Schools.
Limassol District:	12 Schools.	*Kyrenia District:*	14 Schools.

TRIALS OF SILKWORM EGGS, 1936.

The trials of silkworm eggs carried out in 1936 at the Agricultural Department's Sericultural Station at Kalopanayiotis were arranged on similar lines to those of 1935, which were described on page 96 of this "Journal" for December, 1935 (*Cyprus Agricultural Journal*, Vol. XXX, Part 4).

The eggs used in these trials in 1936 were as follows:—

(A) Eggs produced in the Sericultural Station the previous year and the result of three years selection in the Station.
(B) Eggs produced by crossing the races "Jean Blanc" and "Barret" (No. 0).
(C) Ditto, (No. 00).
(D) Eggs imported commercially.

The eggs (B) and (C) above were supplied by the *Société Française de Sériciculture*, Marseilles.

Five separate rearings were made from each of these four lots of eggs, each rearing consisting of ½ dram of eggs, so that there were 20 rearings altogether. The rearings were all treated similarly and reared in the same rooms so that any difference in yield of cocoons obtained should be due to differences in the eggs and not to any other cause.

All the eggs were put in the incubator at the same time. The (D) eggs commenced to hatch 2 to 3 days earlier than the others and completed hatching about a day earlier, but all the varieties commenced spinning at about the same time.

Four of the five lots of (D) eggs gave smaller yields than any of those given by the other eggs, the highest yields obtained being at the rate of 56 okes per ounce of eggs given by one of the lots of (B) eggs.

The average yields given by the five lots of each variety were as follows, calculated as the yield per ounce (8 drams) of eggs :—

(A) 51 okes 96 drams.	(C) 51 okes 48 drams.
(B) 54 okes 144 drams	(D) 44 okes 26 drams.

The differences between (A), (B) and (C) are relatively small but may indicate that the (B) eggs may be expected to give a slightly better yield than (A) or (C), but the difference is not great enough to make this quite certain. There is no real difference between (A) and (C). The yield given by the (D) eggs is distinctly less than those given by (A), (B) and (C).

It must be pointed out that these experiments were carried out at Kalopanayiotis, at an altitude of about 2,350 feet, and, therefore, the results may not be the same as those which might be obtained under different climatic conditions in other parts of the Island.

The average production obtained in 130 Girls' Schools in the 1936 season was 46 okes per ounce of eggs, using the same eggs as those in (A) above, and the average yield for the Island was 24 okes 132 drams. The average yield obtained from the (D) eggs (44 okes 26 drams) was rather less than the average yield (44 okes 256 drams) obtained from eggs from the same source in 1935, but the eggs produced in the Sericultural Station gave a yield of 51 okes 96 drams in 1936, compared with 48 okes 288 drams in 1935.

HIBERNATION OF SILKWORM EGGS.

The same house at Pedhoulas which was used for this purpose last year has been rented by the Agricultural Department for the natural hibernation of all locally produced and imported silkworm eggs, where they will be under the supervision of the Agricultural Assistant stationed at Kalopanayiotis. All silkworm eggs are required to remain in hibernation from 5th January to 20th February.

ISSUE OF MULBERRY PLANTS FREE OF CHARGE.

The Agricultural Department has again arranged for the issue of mulberry plants this season from the nursery and school gardens free of charge to farmers interested.

Farmers desirous of taking advantage of this offer should apply to the nearest Agricultural Station.

A total of 17,000 young mulberry plants were issued free of charge last season to farmers from nursery gardens and school gardens.

COMPARATIVE STATEMENT SHOWING THE QUANTITY OF SILKWORM EGGS HATCHED OUT AND REARED DURING THE YEARS 1934, 1935 AND 1936.

District	1934	1935	1936
—	ozs.	ozs.	ozs.
Nicosia	710	858	820
Larnaca	271	249	230
Limassol	179	138	170
Famagusta	1,130	985	1,023
Paphos	1,269	800	750
Kyrenia	1,026	940	1,098
Total	4,585	3,970	4,091

THE FOLLOWING TABLE SHOWS THE QUANTITY OF SILK COCOONS AND SILK PRODUCED IN 1936, AS SHOWN IN AGRICULTURAL OFFICERS' REPORTS.

District	Cocoons purchased by merchants okes	Cocoons used for egg production okes	Cocoons spun into thread okes	Cocoons reeled okes	Silk produced okes	Total production of cocoons in okes
Nicosia	1,000	722	848	16,800	2,026	19,370
Larnaca	250	—	1,200	5,450	659	6,900
Limassol	371	6	40	3,953	504	4,370
Famagusta	800	130	1,800	17,870	2,100	20,600
Paphos	7,000	156	3,800	8,144	1,019	19,100
Kyrenia	2,889	—	986	25,315	3,082	29,190
Total	12,310	1,014	8,674	77,532	9,390*	99,530

* All silk was reeled by local reeling apparatus.

Banana Growing in Cyprus.

BANANA growing is carried on on a small scale in certain areas in Paphos District, where small plantations provide profitable sidelines to a few enterprising farmers. There are two varieties of banana grown: the "Paphitiko," a large plant bearing bananas of the "fig" type and the "Zanzibari," a dwarf variety similar to the Cavendish. Both varieties produce fruit of good flavour at prices ranging from 5*s.* to 7*s.* per bunch, which leaves a substantial margin for profit. There is no reason why the area under the crop should not be increased, but improved methods should be adopted by growers. The two drawbacks to banana growing in Cyprus are wind and the possibility of frost and the crop can only be grown with success in well sheltered areas in those parts of the Island where the winter is mild.

Cultivation.—The true stem of the banana plant is an underground rhizome with very short internodes which gives rise to the trunk or "pseudostem" composed of sheathing leaf bases, as well as a large number of suckers. Propagation can be done by planting pieces of the

parent rhizome (" bits "), or the suckers. There are two types of sucker, the sword sucker which is recognized by its long pointed leaves and arises at the base of the rhizome and the broad leaf type which resembles a banana plant in miniature and arises near the surface. The former is preferred for planting, and should be removed from the parent plant when 3–4 feet in height.

Preparation of the land before planting is important and deep cultivation coupled with heavy dressings of organic manure are essential if good yields are to be obtained. Holes 2′ square should be dug to receive the suckers and half filled with organic matter. The root system of bananas is poor and every encouragement must be given to produce adequate reserves of plant food in the soil. The best spacing for the plants is 10′ by 10′ for the *Paphitiko* variety and 7′ by 7′ for the *Zanzibari*, with one sucker per hole.

The first bunch will be ready for harvest in about a year's time and subsequent bunches will depend on the method of pruning adopted. Suckers are produced throughout the growing season and much of the art of growing bananas depends on which are removed and which are allowed to remain. There are several systems of pruning in vogue, but the general principle is to produce a succession of bunches as close together as possible without having more than one bunch in the course of production at any given time. Leaving too many suckers to develop will result in loss of vigour and production of small bunches. It is suggested that not more than four suckers should be developing at once, for example one would be bearing a bunch ready for harvest, the second would be about half mature and the others in early stages of growth.

A bunch should be harvested when still green, when the hard ridges on the bananas have become rounded off, and allowed to ripen off the tree. All leaves and trash should be returned to the soil and mulched round the base of the stool. As a general estimate the banana yields one bunch the first year, and two in the second, third and possibly fourth years, after which it is advisable to replant. Manurial dressings are important and a suggested dressing is 5 okes organic manure plus $\frac{1}{5}$ oke of sulphate of potash per tree per bunch, the crop removing a disproportionately large amount of potash from the soil, a fair amount of nitrogen and a little phosphate. Manure has no effect on a bunch after the inflorescence has appeared, so application of manures should be made early. The plants require a large amount of water and frequent irrigations should be given in the dry months.

After bunches have been harvested, it is essential that the ripening process is carried out at a comparatively high temperature. Fifty-four degrees Fahrenheit may be regarded as the absolute minimum that a bunch will stand without " chill " effects resulting in failure to ripen. The poor flavour of some of the late bunches from Paphos is undoubtedly due to chilling after harvest.

SUMMARY.

1. Bananas are cultivated profitably, but haphazardly, in Paphos District and it may be possible to extend cultivation in the sheltered parts of the Island.

2. Suggestions are made concerning the improvement of the cultivation of the crop.

3. A note on the danger of " chilling " is given.

EDITORIAL AND ADVERTISEMENT NOTICES

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Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

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SCALE OF ADVERTISEMENT CHARGES.

PRIVATE ADVERTISEMENTS.

The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

The Horse Breeding Law, 1930.

LIST OF STALLIONS LICENSED FOR 1936.

NICOSIA DISTRICT.

Village		Owner's name		Reg. No.
Akaki	..	Michael Th. Rafti	..	29
do.	..	Elias M. Tsinga	..	203
Argaki	..	Polyvios Theophani	..	153
Astromeritis	..	Christoforos Evangeli	..	26
Elea	..	Rejeb Ahmed	..	254
Kalokhorio	..	Yioryis Papaconstantinou	..	262
Kato Kopia	..	Yeoryios Haji Haralambou	..	27
Kochati	..	Halil Mehmed	..	264
Lefka	..	Yiangos G. Boyiadji	..	20
Lymbia	..	Andronikos Petri	..	32
do.	..	Kyr. Constantinou	..	33
Mammari	..	Nicolas Haji Haralambou	..	206
Meniko	..	Michaelis Haji Gibri	..	26
Morphou	..	Vasilis T. Spanos	..	18
do.	..	Andreas Ahapittas	..	249
Nicosia	..	Haji Costas Haji Panayi	..	62
Philia	..	Towlis Haralambou	..	255
Xeri	..	Theoris Constanti Menikioti	..	247
Yeri	..	Yeoryos Petri	..	16
Yerolakkos	..	Haralambos Sophokli	..	194
do.	..	Hj. Michael Hj. Loi	..	35

LARNACA DISTRICT.

Alaminos	..	Salih Jumaa	..	64
Aradhippou	..	Costis Kyriakou	..	15
do.	..	Lefteris Towli	..	225
Athienou	..	Yiangos N. Kalapodha	..	22
do.	..	Haris Antoni	..	66
do.	..	Costas N. Haji Vrashimi	..	96
do.	..	Vasilis M. Phiakou	..	159
Kophinou	..	Hussein Handji Ibrahim	..	209
Larnaca	..	Vasilis Demetri	..	43
Voroklini	..	Panayis Theodosi	..	106
do.	..	Haral. A. Chapoulis	..	220

FAMAGUSTA DISTRICT.

Akanthou	..	Yiannis Hambi	..	270
Angastina	..	Gavriel G. Kamenou	..	260
Asha	..	Antonis Michael	..	92
do.	..	Demetris Kounallis	..	208
do.	..	Christos Haji Lavithi	..	234
do.	..	Kyriakos Antoni	..	239

Village		*Owner's name*		*Reg. No.*
—		—		—
Ayios Andronikos	..	Spyros Yeoryi	..	65
do.	..	Christofis Hambi	..	240
Ayios Elias	..	Constantis Stylli	..	246
do.	..	Yeorgios Christodoulou	..	265
Ayios Seryios	..	Antonis S. Gizas	..	68
Ephtakomi	..	Loizos Hambaka	..	219
Famagusta	..	Ibrahim Mehmet Kallika	..	211
Galatia	..	Akil Mustafa Gonie	..	54
Kalopsidha	..	Yeoryios Antoniou	..	267
Komi Kebir	..	Kyriakos Antoniou	..	48
do.	..	Christodoulos K. Sphongos	..	101
Kondea	..	Christos Hanni	..	259
Lefkoniko	..	Mehmed Salih	..	38
do.	..	Christos Haji Symeou	..	41
Leonarisso	..	Chrysanthos Panayi	..	56
Lysi	..	Minas Lysandrou	..	80
do.	..	Artemis Haji Constandoura	..	227
Melanagra	..	Kallis Kyriakou	..	60
Milea	..	Loizos Panayi	..	257
Do.	..	Sotira Panayi	..	193
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do.	..	Demetrios Michael	..	251
do.	..	Kyprianos Stylli Haili	..	266
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do.	..	Christina Prokopiou	..	88
do.	..	Vasiliki Haji Christodoulou	..	89

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Anoyira	..	Thoukis Solomi	..	143
Asgata	..	Demosth. Evangeli	..	119
Ay. Phyla	..	Costis P. Silikiotis	..	118

Village		*Owner's name*		*Reg. No.*
Episkopi	..	Bairam Mehmed	..	131
Limassol	..	Mehmed Mustafa	..	40
Mesayitonia	..	Demetris Karkallis	..	117
Pakhna	..	Theodoros Evgeniou	..	121

PAPHOS DISTRICT.

Amarketi	..	Mulla A. M. Mustafa	..	125
Dhrousa	..	Yiannis Sava	..	139
Kissonerga	..	Evangelis Haji Nicola	..	126
do.	..	Haji Towlis Haralambou	..	129
Kouklia	..	Mehmed Hassan Kokkinos	..	215
Ktima	..	Veli Tselebis	..	127
Lapithiou	..	Mehmed Mulla Osman	..	263
Lasa	..	Yeoryios Ch. Ellinas	..	130
Pano Arodhes	..	Harilaos Nicolaou	..	136
do.	..	Chrysost. Panayiotou	..	214
Phasli	..	Hassan Tahir	..	228
Phyti	..	Costis Georgiou	..	268
Prodromi	..	Avraamis Sava	..	248
Steni	..	Costis Pelekanides	..	230
Stroumbi	..	Sofoklis Constanti	..	178
Terra	..	Mustafa Yusuf	..	141

KYRENIA DISTRICT.

Agridhaki	..	Haralambos Yianni	..	147
Asomatos	..	Christallou Michaeli	..	146
do.	..	Antonis Haji I. Hanni	..	150
Ayios Amvrosios	..	Nicolas Haji Demetri	..	256
Ayios Ermolaos	..	Efstathios Christofi	..	166
Ayios Yeoryios	..	Costis N. Spanou	..	157
Bellapais	..	Savas K. D. Jirkaji	..	161
do.	..	Savas K. Demetriades	..	236
Dhiorios	..	Gregoris Haji Michael	..	148
Kyrenia	..	Shakir Hussein	..	158
Lapithos	..	Polyk. Panayioti	..	99
do.	..	Artemis H. Proestos	..	156
Larnaka tis Lapithou		Ioannis Costi	..	152
Myrtou	..	Cleov. Stylianou	..	149
Sisklipos	..	Lavithis Demetriou	..	232

ROBERT J. ROE,
Chief Veterinary Officer,
Inspector of Horse Breeding.

31*st* *December*, 1936.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

SEPTEMBER, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District:							
Nicosia	89.17	63.40	0.04	1	0.04	0.28	—
Athalassa	—	—	0.61	2	0.58	0.64	—
Morphou	96.00	60.66	—	—	—	0.18	—
Makhæras	—	—	—	—	—	0.20	—
Famagusta District:							
Famagusta	90.97	64.97	—	—	—	0.22	—
Akhyritou	88.30	63.40	0.04	1	0.04	0.18	—
Rizokarpaso ...	—	—	0.30	1	0.30	0.28	—
Lefkoniko	—	—	1.75	1	1.75	0.50	—
Larnaca District:							
Larnaca	91.00	62.00	0.76	1	0.76	0.48	—
Lefkara	—	—	0.48	2	0.40	0.66	—
Limassol District:							
Limassol	87.77	62.13			—	0.03	—
Saittas		—		—		0.91	—
Trikoukkia	—	—	—	—		0.93	—
Alekhtora	—	—	0.12	1	0.12	0.15	—
Paphos District:							
Paphos	—	—			—	0.16	—
Polis...	—	—	0.12	1	0.12	0.35	—
Kyrenia District.							
Kyrenia	85.24	67.80	—	—		0.30	—

OCTOBER, 1936.

District and Station	Maxim.	Minim.	Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District:							
Nicosia	86.39	60.81	0.04	2	0.02	0.59	—
Athalassa	—	—	—		—	0.61	—
Morphou	93.90	51.61	0.20	3	0.12	0.32	
Makhæras	—	—	—			0.86	
Famagusta District:							
Famagusta	81.48	63.87	—			0.85	
Akhyritou	89.20	59.60		—		0.69	
Rizokarpaso ...	—	—	0.10	1	0.10	0.81	
Lefkoniko	—	—	—			0.41	
Larnaca District:							
Larnaca	85.00	62.00	0.10	2	0.08	0.85	—
Lefkara	—	—	0.15	1	0.15	0.93	—
Limassol District:							
Limassol	84.39	60.00	—	—	—	0.84	—
Saittas	—	—	0.22	1	0.22	0.69	—
Trikoukkia	71.85	46.30	0.53	2	0.45	1.85	—
Alekhtora	—	—	—	—	—	0.82	—
Paphos District:							
Paphos	—	—	—	—	—	0.88	—
Polis...	—	—	0.94	2	0.53	1.04	—
Kyrenia District:							
Kyrenia	75.14	64.11	0.17	1	0.17	0.79	—

Note.—Compiled from returns furnished by Public Works Department.

NOVEMBER, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	No. of days rain	Greatest fall in one day	Average for 10 years inches	Dates on which snow fell
Nicosia District:							
Nicosia	73.73	51.93	0.84	6	0.37	1.07	—
Athalassa	—	—	0.36	2	0.33	0.91	—
Morphou	92.00	51.30	1.74	7	0.38	0.89	—
Makhæras	—	—	1.00	1	1.00	2.02	—
Famagusta District:							
Famagusta	78.00	53.00	1.30	6	0.85	1.80	—
Akhyritou	74.10	51 60	1.47	5	1.20	1.38	—
Rizokarpaso ...	—	—	1.90	5	0.50	2.59	—
Lefkoniko	-	—	1.19	4	0.60	1.15	—
Larnaca District:							
Larnaca	74.00	54.60	0.50	5	0.20	1.64	—
Lefkara		—	1.20	3	0.90	2.65	—
Limassol District:							
Limassol	75.13	54.47	0.80	8	0.53	1.85	—
Saittas		—	1.30	6	0.43	1.40	—
Trikoukkia... ...	61.20	41.30	2.16	8	0 49	1.96	—
Alekhtora	—	—	-	-	-	1.85	—
Paphos District:							
Paphos	-	-	-	—	—	1.96	—
Polis...	-	—	2.88	7	1.20	1.58	—
Kyrenia District:							
Kyrenia	70 13	57.17	2.62	8	1.04	2.61	—

Note.—Compiled from returns furnished by Public Works Department.

Department of Agriculture, Cyprus.

HEADQUARTERS—NICOSIA.

... general correspondence should be addressed to the Director Agriculture.

Correspondence and applications for advice referring to the ...erinary, Entomological, Plant Pathological or Chemical ...anches, should be addressed to the Officer in charge of the Branch. When seeking advice in regard to treatment of plant pests or diseases, specimens should, whenever possible, be sent.

GOVERNMENT STOCK FARM, ATHALASSA AND DISTRICT STUD STABLES.

Applications for services of stud animals at Athalassa or the supply of live stock, poultry, eggs, etc., should be addressed to the Manager, Stock Farm, Athalassa. Applications for services of stud animals at District Stud Stables should be made to the Stud Groom in charge. There are Stud Stables at Famagusta, Vatili, Rizokarpaso, Ayios Theodhoros, Lefkoniko, Larnaca, Limassol, Paphos and Polis.